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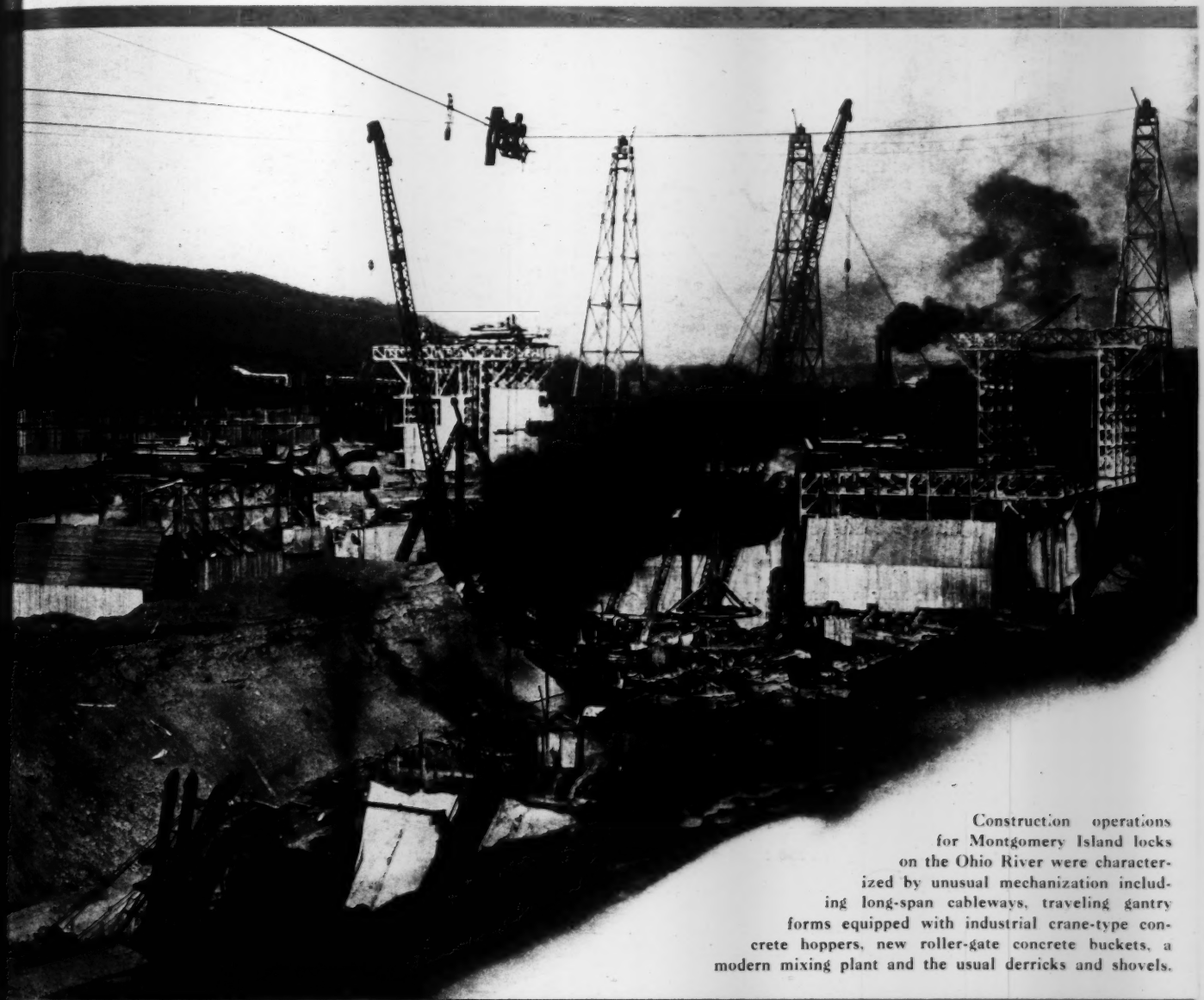
October 25, 1934

Engineering News-Record

OCT 30 1934



Construction operations for Montgomery Island locks on the Ohio River were characterized by unusual mechanization including long-span cableways, traveling gantry forms equipped with industrial crane-type concrete hoppers, new roller-gate concrete buckets, a modern mixing plant and the usual derricks and shovels.

Building the Montgomery Island Locks on the Ohio River . . . Three Long-Span Steel Bridges for Washington Highways . . . Sealcoat-Type Road Surfaces in Los Angeles County . . . A Swiss Study of the Boulder Dam Spillways . . . Placing 40-ton Concrete Pipe in Little Morongo Siphon

Based on experience . . .

BYERS WROUGHT IRON SHEETS

WERE SELECTED FOR DOCK REPAIR

Pier Sheds of the New York Dock Company, Brooklyn, are repaired with Byers Genuine Wrought Iron Sheets. New York Dock Company property indicated in right foreground.

MANY newer materials have been substituted for the jobs that wrought iron has done so well for years—and, in many cases, replacements have come too soon.

The experience of the New York Dock Company will illustrate this point. Replacements were necessary. What material should be used? Obviously, the same material that had failed should not be used again—it had already given too short a service.

The Chief Engineer reviewed his experience with many kinds of sheets, and on the basis of his findings specified Genuine Wrought Iron Sheets for sheet metal replacement on their pier sheds.

If your roofing and siding replacements come too soon bear in mind that wrought iron gives long and satisfactory service in salt and sulphur-laden atmospheres and under many other corrosive conditions too severe for ordinary sheets.

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Competitive Industry No Place for Government

"BELIEVE It or Not," as Brother Ripley would put it, a recent news item relates that in connection with a survey for a prospective public works program in Porto Rico consideration is being given to the erection of a government-owned plant for the manufacture of cement.

The "Believe It or Not" is inspired partly by another news item, which appeared but shortly before, recording the final curtain on another such venture in state manufacturing and partly by a Washington dispatch reporting the opposition of the National Association of Manufacturers to the government's entering into manufacturing through the Federal Emergency Relief Administration.

About ten years ago Michigan bought a plant to make cement. It paid for it more than a half million dollars, despite well informed opinion that, as a commercial venture, it was not worth anything near that amount.

As is usual in such cases, controversy has prevailed as to whether the plant actually justified itself in savings to the state. But there can be no doubt that before very long the state found itself with a substantial investment in an industry in which demand was falling rapidly with respect to capacity. So the state decided to shut down operations and sell the plant. Now, after carrying it in idleness for three or four years with a fairly heavy but non-productive payroll, it finally has sold it for junk. The buildings are being wrecked by convict labor.

Whatever might be offered to explain or excuse the entry of government into a manufacturing business during a period of extreme shortage, public peril or any other urgent necessity, it is not easy to justify such a procedure under present conditions. Today demand is barely enough to save legitimate producers from extinction and the chief problem of the government is acknowledged to be that of reviving private industry.

Surely, with the fields now open to government investment along normal and established lines, it is no time for it to invade still farther those fields in which private industry already has so great an investment and to which it must look for its survival. That would be an act of sabotage. We can better apply the public credit to the provision of normal public facilities that will add to the community wealth and create employment for existing industries and their workers rather than embark upon commercial ventures which, from their very nature, must put public ownership and operation under a handicap.

The taxpayer of tomorrow may reasonably be expected to pay for the present investment in public works. He should not be expected to assume the risk of continuous operating deficits and eventual total loss that might well be the sequel to public operation in a competitive field.

All this is quite in accord with the contention of the National Association of Manufacturers that "entrance by the government into the manufacturing business in competition with its own citizens, even to supply relief for the unemployed, constitutes an extravagant use of the taxpayers' money in further experimentation." But it is interesting to observe, in passing, how clearly organized business sees this truth when manufacturing is concerned, while it appears to be so indifferent to the entry by government into the construction industry.

After all, precedent is precedent, and if business is so concerned over the possibility of governmental day-labor in the manufacturing industries it may be wise to help in curbing the tendency of governmental day-labor to run rampant in the construction industry.

Willard Chevalier

ENGINEERING NEWS-RECORD

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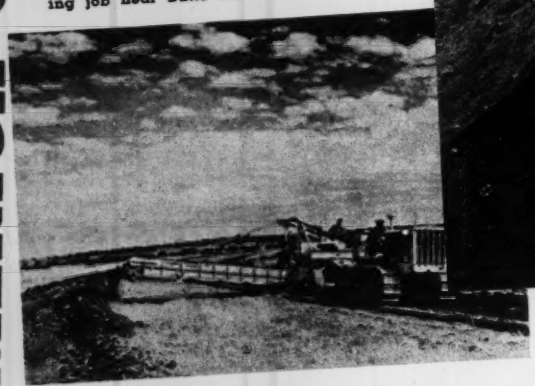
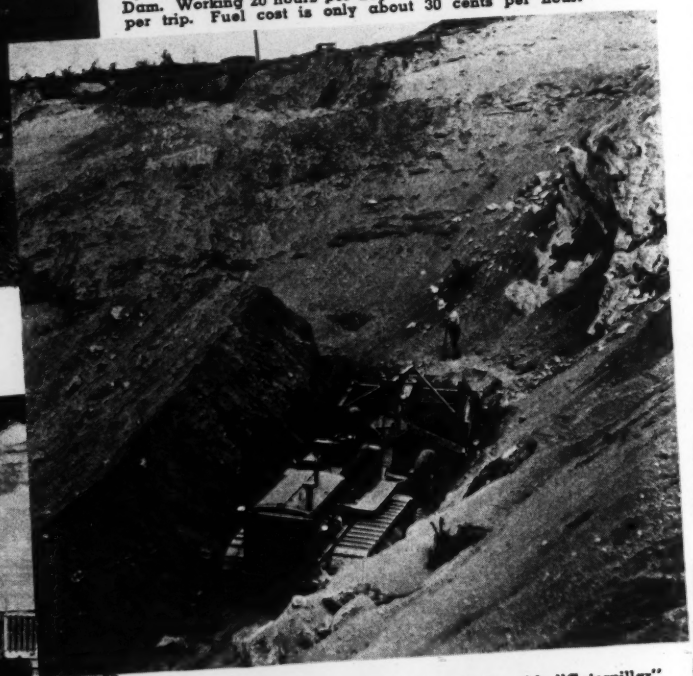
AMERICA GOES DIESEL

•AMERICA GOES DIESEL•

▲ This bulldozer-equipped "Caterpillar" Diesel Seventy-Five Tractor supplies low-cost, dependable power to Contractor Clarence Young for a mountain road building job near Butte Meadows, California.



▼ This is one of three "Caterpillar" Diesel Seventy-Five Tractors on Mr. R. Roland's contract at Coulee Dam. Working 20 hours per day. Moving 11 to 12 yards per trip. Fuel cost is only about 30 cents per hour.



◀ Pulling a "Caterpillar" Elevating Grader, this "Caterpillar" Diesel Fifty Tractor is doing canal construction work for the Irrigation Department of the Union of South Africa.

AMERICA GOES DIESEL

•AMERICA GOES DIESEL•

"SO WE INCREASED OUR FLEET OF 'CATERPILLAR' DIESEL TRACTORS"

—SAYS H. W. McKINLEY, GLENDALE, CALIFORNIA, CONTRACTOR, AFTER HIS COST RECORDS SHOWED THAT THREE BIG "CATERPILLAR" DIESEL TRACTORS WERE COSTING LITTLE MORE FOR FUEL THAN ONE 30-HORSEPOWER GAS TRACTOR.

Another southern California contractor, Clarence Crow, of Crow Brothers, writes: "Our fuel cost for each of our 'Caterpillar' Diesel Seventy-Five Tractors is only one-fifth of what it used to be for our big gas tractors."

Other owners, everywhere, report similar results. Says E. B. Boyle, President of the Boyle Road and Bridge Company of Sumter, S. C.: "Fuel for the 'Caterpillar' Diesel costs us less than 1/3 the cost of fuel for a gas machine of the same size." From Pickering, Mo., Mr. L. O. Killion writes: "Ten to twelve gallons of fuel is driving the Diesel Thirty-Five the same number of hours that 25 gallons of gasoline did the gas 30-h. p. tractor, besides doing one-half more work."

More work—less cost—such are the results reported by the thousands of enthusiastic owners of "Caterpillar" Diesel Tractors and Power Units. That explains why more and more users of tractors and stationary power are going Diesel—with "Caterpillar." Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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In the News:

PWA FUNDS allotted to the Department of Agriculture will be readjusted within the department, to provide $450,000 for completing the Beltsville research center project on which work was shut down early in June after exhausting the $2,481,-017 orginal allocation. Working conditions on the project and extensive use of force-account work resulted in an investigation and protest from the A.G.C.

NO CAISSON will be used for building the south pier of the Golden Gate Bridge. The revised plan consists of completing the concrete fender ring and constructing the pier in the dry on a 50-ft. thickness of tremie concrete.

WITH WORK GOING AHEAD on the low-dam power development at Grand Coulee, the local backers of the project are now organizing for an active campaign to have the work expanded to include the ultimate high dam and extensive irrigation development.

IN THE CHICAGO CASE over the activated-sludge patents, the district court decision upheld the four patents already declared infringed in the Milwaukee case, declared a fifth patent infringed but held the sixth claim covering spiral flow to be invalid.

LEGAL FORMALITIES have finally been cleared for closing the PWA financing of $2,500,000 for extending and improving the sewerage and drainage system in New Orleans. Opening of bids is now scheduled for December and January.

AS A FURTHER REMINDER of the flood hazard in the foothill areas back of Los Angeles, a storm on Oct. 17 damaged houses and buried streets with debris in the La Crescenta area, which was visited by a disastrous flood last January.

IN THE GREAT PLAINS REGION a new organization, the Water Conservation Congress, has been formed to foster a united interest in a program of water control and conservation in the belt of states extending from North Dakota to Texas.

TVA HAS DECIDED to purchase cement for its construction program from established concerns and has dropped the suggested proposal to build its own plant.

FROM THE PRESIDENT'S press conference last week it was learned that Congress is to be asked to appropriate money for a greatly expanded program of housing. Later, PWA revealed the present status of its housing operations: the last of its seven limited-dividend projects is about to start; nine federal projects are in their early stages, and funds have been tentatively allotted to thirty others. Limited dividend, $11,500,000; federal projects $138,500,000; total $150,000,000, or all the housing division has to spend.

In This Issue:

A CABLEWAY SYSTEM proved a successful innovation in lock construction by a resourceful contractor on an Ohio River canalization improvement. Three units located over the lock walls were used for excavation, forms and concreting. The construction plant and methods are reviewed.

AT THE GRAND COULEE DAM SITE on the Columbia River and across Deception Pass on an arm of Puget Sound, the Washington state highway department is building long-span steel bridges, which are outlined as to principal features and dimensions.

THE UNUSUAL HYDRAULIC PROBLEMS involved in designing spillways for Boulder Dam were an incentive for an analysis and model study made by the Swiss Federal Hydraulic Research Laboratory. The analytical solution is reviewed, the model work described, and the conclusions are outlined.

THE ISSUE OF JAN. 25, 1934, contained the description of a simple inexpensive apparatus for measuring the heat of hydration of portland cement, and in this issue an improvement in the equipment and procedure is reviewed as the work of another experimenter in the field.

AN APPRAISAL of long-span bridge development is presented from the point of view of Ralph Freeman, British consulting engineer.

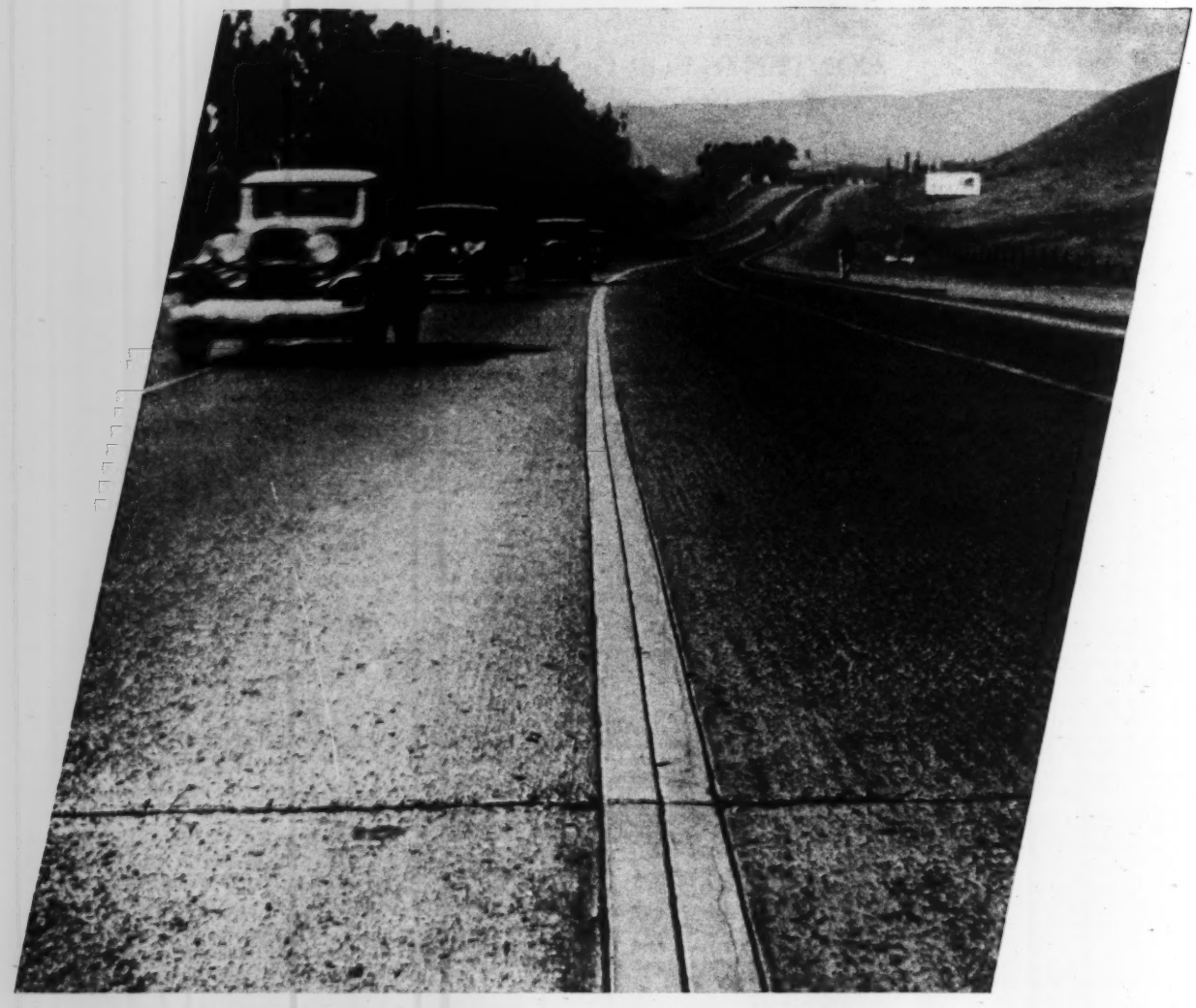
LOS ANGELES COUNTY carries forward an extensive program of highway construction and maintenance on a 4,200-mile system of secondary roads. The various types of seal-coat surfacings, the methods of construction and the equipment used are described by one of the district engineers.

THE UNPRECEDENTED PROBLEM of placing 12-ft. lengths of 12-ft. diameter precast concrete pipe, weighing 40 tons each, to form part of the Little Morongo siphon of the Colorado Aqueduct, demanded great ingenuity on the part of the engineers in charge of construction.

Coming Articles:

HIGH NORMAL FLOWS and peculiarities of the formation of the river valley at Bonneville on the Columbia River near Portland have introduced unusual problems into the task of building a power and navigation dam across the river at that point. Details of the work now under construction are to be given in an article to be published next week.

Indelible white concrete traffic markers END REPLACEMENT COST!



Double white concrete traffic marker in concrete pavement, Bayshore Boulevard, San Francisco. Installed by Basich Bros., Los Angeles.

WHAT is an *indelible* marker? The dictionary says that something *indelible* is something that cannot be blotted out or effaced. Atlas White traffic markers meet that definition. Built of permanent white concrete, they *stay* white, year after year. Neither weather nor traffic can blot them out or efface them. They are *indelible.* But their cost is far from indelible, because their cost is soon erased by the saving in maintenance. These markers require no maintenance. They last as long as the pavement lasts—always and *indelibly* white. Write for full details to Universal Atlas Cement Co., *Subsidiary of United States Steel Corporation*, 208 South La Salle Street, Chicago.

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ATLAS WHITE TRAFFIC MARKERS

Made with Atlas White Portland Cement—Plain or Waterproofed

ENGINEERING NEWS-RECORD

October 25, 1934

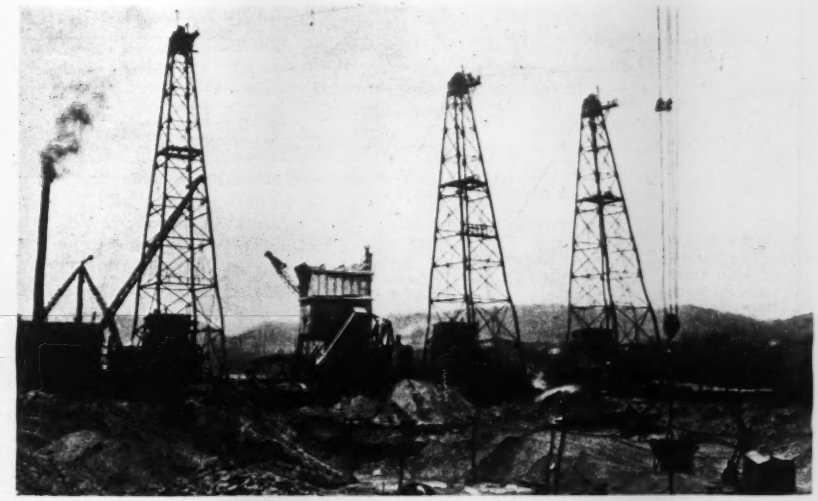


FIG. 1—HEAD TOWERS of the triple cableway system at Montgomery Island locks were set on the downstream shore arm of the box cofferdam. In combination with the central mixing plant shown, the set-up made new concrete placement records for the Ohio River Valley lock and dam work.

Three Long-Span Cableways Place Concrete on Ohio River Locks

Fixed 1,500-ft. cableways, centered over river, middle and land walls of Montgomery Island Locks, handle excavated material and backfill, steel and concrete—Forms are traveling steel gantries—Concrete placing sets record

FOLLOWING the successful construction of the long George Westinghouse bridge at Pittsburgh by the use of cableways (*ENR*, July 21, 1932, p. 67), the same contractor installed three cableways of 1,510-ft. span at the Montgomery Island locks on the Ohio River with equal success. Three fixed-head towers on the downstream shore arm of the cofferdam and corresponding fixed-tail towers on the upstream cofferdam were located so as to center a cableway line over each of the three walls—river, middle and land—of the pair of locks. These cableways handled much of the excavated material and backfill, placed all of the concrete, aided in erecting forms and transported miscellaneous supplies and materials. A well-equipped central mixing plant, set on the cofferdam between two of the head towers, supplied concrete for the job. Transportation to forms was by means of the new-type roller-bottom dump buckets of 5-cu.yd. capacity, which proved highly successful for cableway operation. Another modern touch to this job was the use of traveling steel wall forms designed as gantries. Land and floating derricks and power shovels supplemented the cableways. The extensive and well-planned use of equipment on this job permitted rapid construction progress despite delays caused by several severe floods.

Replaces three old locks

The Montgomery Island project, located on the Ohio River 4 miles below Beaver, Pa., consists of two locks and a lift-gate type dam. With the locks just completed, work is now under way on the construction of the dam. The dam will become the third fixed structure on the river below Pittsburgh, replacing existing dams 4, 5 and 6. The locks, located on the left bank of the river, consist of an inner lock 110x660 ft. and an outer lock 56x360 ft., separated by a common middle wall. Each lock floor carries a paving of 6x6 ft. concrete blocks 2 ft. thick, with a 6-in. weep hole in the center of each block.

Rock is found at the site at a fairly uniform level at approximately El. 620, though most of the foundations were carried down to El. 614, well into sound ledge. Over the rock lies 30 ft. of shale and water-bearing gravel through which 35-ft.-wide foundations for the three main walls were carried down to ledge. With top of locks at El. 692, these main walls are unusually high—78 ft. The guide and guard walls, extend-

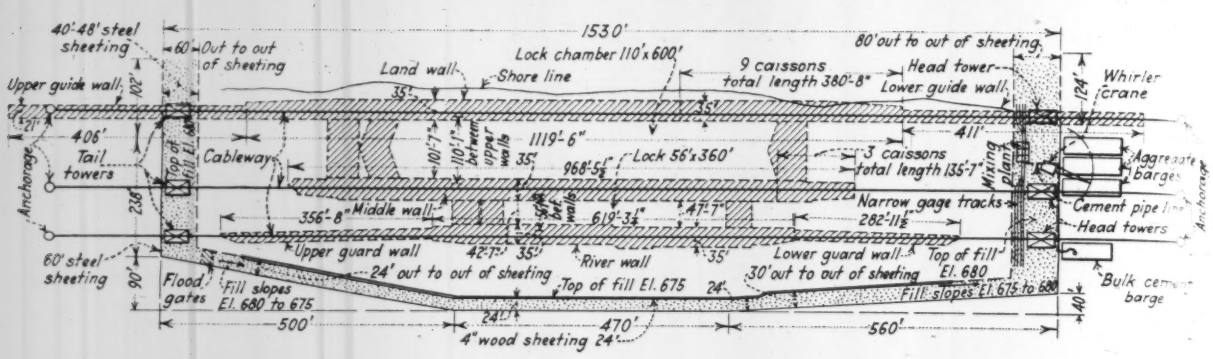


FIG. 2—COFFERDAM AND CABLEWAY system at Montgomery Island. Each lock wall was served by a fixed cableway. Sinking twelve concrete caissons for wall footings speeded up the wall-building schedule.

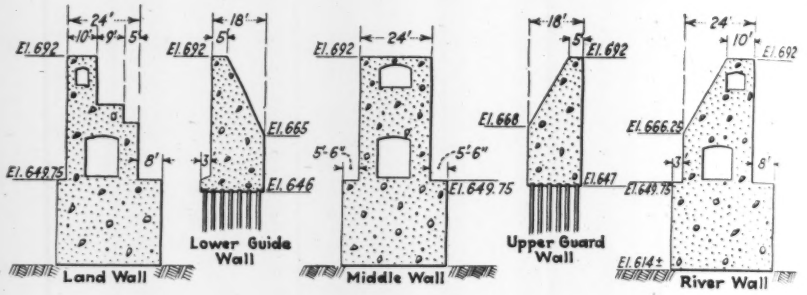


FIG. 3—TYPICAL SECTIONS of walls for Montgomery Island locks. Except for the lower 10 ft. of foundations, traveling gantry forms were used to good advantage on long main-wall sections.

ing up and downstream from the land and river walls, vary from 40 to 45 ft. in height, and are founded on 3,000 wood piles. Including 1,110 ft. of main wall, 416 ft. of guide wall upstream and 411 ft. downstream, the land wall is 1,937 ft. long. The middle wall totals 969 ft. in length, while the river wall is 1,259 ft. end to end of guard walls, including 619 ft. of main wall.

Design of cofferdam

The deep bed of gravel overlying the rock made the Ohio River box type of cofferdam the most practical for this site. This type consists of double rows of sheeting tied with tierods, the outer sheeting going to rock as a water seal. The inner row of sheeting is much shorter, driven only to a toehold in the riverbed. Stability of the structure depends on filling between rows of sheeting and a backfill or berm against the inside face of the dam. To build the main cofferdam long enough to include the long guide walls extending from the land wall would have been a needless expense. Instead, the contractor chose to enclose an area 1,390 ft. long and of 406-ft. maximum width, with the ends somewhat narrowed (Fig. 2). This enclosure included all of the river and guard walls, the center wall, main land wall and about one-quarter of the upper and half of the lower guide walls. After the main cofferdam was removed, single-wall cofferdams were built for the construction of the remaining sections of guide walls.

Normal pool level at the site was El. 662.6 (12 ft. of water, 42 ft. above rock). Flood stage was set by the army engineers as 8 ft. above pool level. The contract provided that each time the river rose above flood stage the contractor received a definite fee, regardless of whether the cofferdam was flooded. As finally designed, the cofferdam was built to withstand floods up to El. 675, or 8 ft. above stipulated flood stage, with top of sheeting placed at El. 680. In March, 1933, the river reached the highest stage in twenty years, overtopping the sheeting by 12 ft. In the next two months the dam was overtopped twice more. Later the river rose four times above flood stage, though the cofferdam was not flooded.

A 60-ft., 33.85-lb., arch-web sheeting was selected for the entire outside wall of the cofferdam. For the inside of the river wall of the dam, 4x12-in. wood sheeting was used, while steel sheeting from the contractor's own stock, 40 to 48 ft. long, was used on the inside of the shore arms. The river wall was 24 ft. wide, but, since the shore arms were to carry the towers and other plant during cable operation, the upstream river arm was made 60 ft. wide and the downstream arm 80 ft. wide. Both shore arms were filled to the top of the sheeting; the river walls to El. 675. The bracing or tie system consisted of three rows of 1½-in. rods tied to 12x12-in. timber wales, except that the lower outside wale, placed by a diver, was a double steel channel (Fig. 5). A sluiceway for flooding the dam was built into the river wall at El. 675.

Cableways

The contractor's success in the use of cableways on arch-bridge construction and excavation conditions led to the adoption of the overhead system of handling both excavation and concrete. Usually a narrow-gage railroad is used for spoil and concrete haulage. At Montgomery Island the deep trench cuts for wall foundations made railroad operation impracticable. Sloping the sides of the footing trenches through the gravel was more economical than sheeting them. With all three walls under construction at once, side slopes and spoil piles for backfilling left little room for track installation. Cableways took the haulage operation out of the hole.

The three cableways were fixed over the center of each lock wall. On the downstream shore arm of the cofferdam were erected three head towers 150 ft. high. Tail towers, set on the upstream arm, were 110 ft. high. The clear span was 1,510 ft., giving an unloaded sag of 70 ft. to the track cable. Under full load the maximum sag was 85 ft. Each of the six towers was guyed by cables to circular sheetpile anchorages. At the head towers were installed main steam hoists for haulage and load lines, and auxiliary hoists for pulling a drag scraper were suspended from the load line of the cableway. Each cableway had a capacity of 25 tons.

Excavation

During the construction of the cofferdam a dredge excavated 150,000 cu.yd. of material from the site, discharging the spoil over the upstream shore arm of the dam. Upon completion and unwatering of the cofferdam, several gas shovels attacked the trench excavation, loading into cableway skips, or trucks where roadways were possible. The cableway draglines handled a considerable part of the wall foundation excava-

tion. Some of the spoil material was stored at the upstream end of the walls for later backfill, though, as the wall construction got under way from one end, considerable spoil was transferred directly from excavation to backfill by the cableways. Backfilling along the walls was dumped from skips onto slope boards set on an A-frame traveling on the footing concrete. For the heavy backfill behind the land wall a narrow-gage railroad was installed, leading up the riverbank from spoil piles at the end of the cofferdam.

Foundation excavation through the shale formation was in trench, often dug to neat lines of the concrete but occasionally requiring sheeting. Stiff-leg derricks handled excavation of the sills of the large lock, transferring the spoil to within reach of the cableways.

Forms and concreting

The walls were poured in three lifts: first, the lower 10 ft. of footing; next, the remaining 20 ft. of the foundation; and last, the 42-ft. upper-wall section. For the first pour usually only low wood forms were needed because of the depth of trench in the shale.

The long high walls of uniform section were ideal for a traveling form system. Five sets of the gantry type of traveler (all 45 ft. long) were built, three 20 ft. high for footings and two 42 ft. high for the top walls. As the footings neared completion, one of the smaller gantries was raised for top wall work. Each gantry consisted of four bent frames with vertical-truss ribs and truss-top connections, with wood-lagging facing and bulkheads. The forms were tied down to anchors embedded in previously placed concrete. Wood and canvas housing was used in cold weather.

An ingenious rig transferred the concrete from cableway bucket to place. On top of each gantry was a traveling carriage that could be moved in two directions. This carriage contained a hopper fixed above a bottom-dump box, suspended by cables passing through a hand-controlled brake drum to a counterweight outside the gantry. Concrete from the cableways was dumped through the hopper into the box. By releasing the brakes the loaded box could be lowered to any desired position and dumped. The counterweight automatically pulled the empty box back into position for loading.

Records were made in concrete placement with the cableway system that have seldom, if ever, been equalled in the Ohio River Valley. In one month, when the bucket travel averaged 2,000 ft. a round trip, 25,140 cu.yd. was placed, 17,000 cu.yd. of which was placed in sixteen 24-hour days. The time required for a round trip of 2,000 ft. averaged 6 minutes.

The concrete was mixed at a central

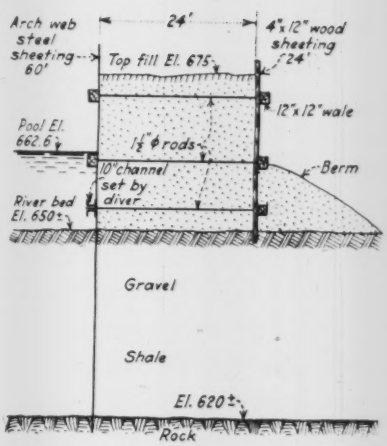


FIG. 5—CROSS-SECTION of cofferdam wall. The width was increased to 60 and 80 ft. for shore arms, to accommodate cableway towers and other plant.

FIG. 4—CONSTRUCTION operations at Montgomery Island, showing tail towers of cableways and traveling gantry forms. Derricks supplemented the cableways in excavation and pouring of lock sills. Traveling hoppers on top of form sections transferred concrete from cableway bucket to place.

FIG. 6—ROLLER-GATE BUCKET especially designed for cableway work, where control of dumping is essential.

plant on the downstream cofferdam between the two inshore cableways. From the mixers the concrete was discharged into 5-yd. buckets set on flat cars and hauled to pick-up points beneath the track cables. To reach the sills of the smaller lock, a towline from a tractor pulled a bucket sideways a maximum of 40 ft. for direct placement of concrete.

A new type of concrete bucket, especially designed for cableway operation, was introduced on this job (Fig. 6). It is cylindrical in shape, has a capacity of 5 cu. yd. and is equipped with a quick-dumping gate of the conventional radial sliding type. The gate was released by a hand trip line, which allows the total load to act as a force for opening it. Stopwatch checks on speed of dumping in this manner place the time of discharge of 5 cu. yd. at 4 sec., thus suddenly relieving the load on the cableway, causing the empty bucket to be jerked rapidly upward.

Later these buckets were all changed to operate with a hand-controlled roller gate, which consisted of a rubber-covered conveyor belt apron supported by a radial cage of rollers, the purpose being to eliminate entirely the friction between the concrete and the discharge gate, thus obtaining the advantage of easy hand control. This feature of controlling the discharge was found desirable as a means of retarding the rate of flow to such an extent that the hoist operator could hold the bucket at a fixed elevation while dumping, thereby eliminating the hazard associated with instantaneous discharge.

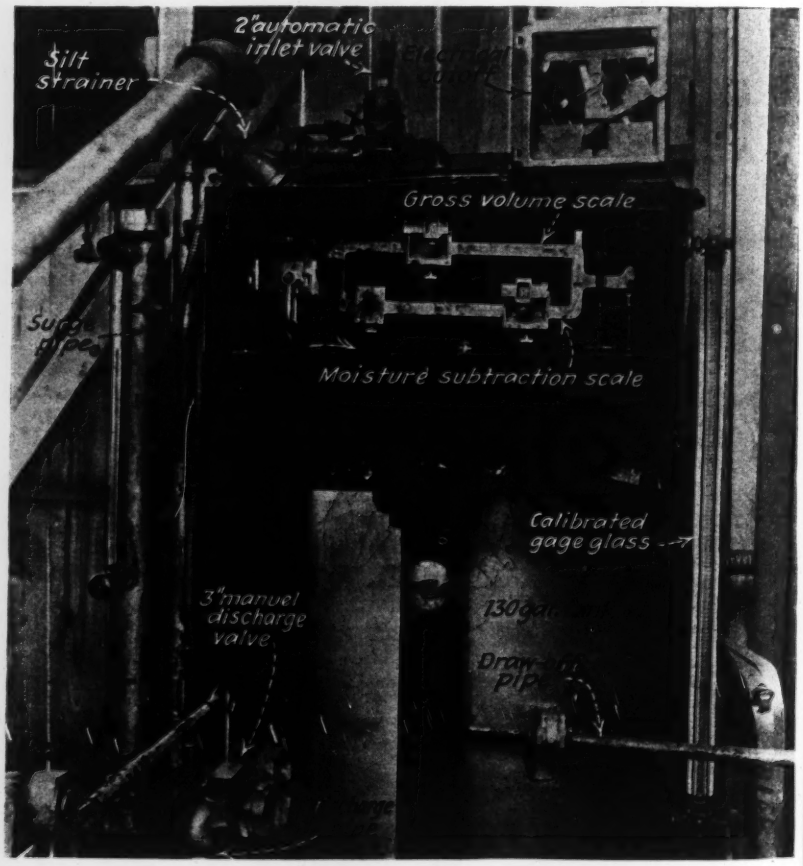
The central mixing plant erected on the cofferdam was designed for efficient and rapid operation. It was equipped with two 2-yd. electric-drive mixers discharging into a common hopper, which, in turn, dumped directly into cableway buckets set on flat cars. The mixing plant included a steel storage bin divided into four compartments holding: 117 tons of sand, 138 tons of 2-in. gravel, 96 tons of 5-in. gravel and 265 bbl. of cement. These compartments were charged by a whirley crane set on the cofferdam, loading from barges moored alongside. Bulk cement was used, being pumped from barges through a 5-in. line to the storage bin. One set of aggregate and cement bins served both mixers. But each mixer had its own proportioning units for measuring all materials by weight. The cement batchers were of the automatic weighing type with pushbutton control, discharging directly into the mixers. Weighing batchers for the aggregates were manually operated, one dial scale showing the accumulated weights of each class of aggregate let into a single weighing hopper. An unusual feature of the plant was an automatic water-weighing unit for each mixer. These consisted of a water tank setting on double-beam platform scales and equipped with a mercury-contact automatic control that closed the inlet valve, opened by pushbutton control (Fig. 7). The scale beams were divided into gallons, with the lower beam providing a quick-setting compensation for moisture in the aggregates. A manually operated valve, interlocked with the inlet valve, dumped the weighed charge of water directly into the mixers. Moisture in the aggregates was checked every twenty batches with scales specially designed for the purpose.

Twelve concrete open caissons were sunk at the downstream ends of the middle and land walls to speed up construction of wall footings. These boxes, 40 ft. long and 26 to 35 ft. wide (the wall ends tapered in width), were built up of 4-ft. concrete walls reinforced with 18-in. I-beams. Excavation was removed by cranes and derricks. A 2-yd. controllable dump bucket was used in pouring these caissons.

Personnel

The locks were designed and built by the U. S. Corps of Engineers, under the direction of Major W. D. Styer, district engineer, Pittsburgh. W. D. Kuehnle, engineer in charge of field activities, and Don P. Keelor, resident engineer, were in active charge. Booth & Flinn Co., Pittsburgh, was the contractor, with George Hockensmith, vice-president and general superintendent, Norman McLeod, superintendent, and J. C. Knu, engineer, in charge.

FIG. 7—AUTOMATIC weighing tank for concrete water supply was a feature of the modern central plant.



Long Steel Bridges Added to Washington Highway System

OF THREE steel highway bridges recently designed by the bridge department, Washington department of highways, two are now under contract and the third is scheduled for construction at an early date. One of the three is a 550-ft. through cantilever span near the site of the Grand Coulee Dam, where it will serve construction purposes and later will be used as a highway structure. The other two, being built as a single project, are to be adjacent structures spanning Deception Pass in Puget Sound, to connect the road system of Whidby Island with the mainland. The Deception Pass spans are 350 and 550 ft. respectively; the latter has the same span length as the Grand Coulee Bridge but is of the deck type. Each of the 550-ft. spans is a cantilever with a 200-ft. central suspended span.

In all three bridges the silicon steel, which is to be used extensively, has been figured for a working stress of 24,000 lb. per sq.in., in comparison with 18,000 lb. allowed in carbon steel members. In general, the loading for all three bridges is the standard H-15 highway loading prescribed by the American Association of State Highway officials. On the Grand Coulee Bridge, however, where heavy construction equipment may concentrate, the flooring and floor framing were figured on the H-20 basis.

The two 550-ft. spans were designed for cantilever erection of the suspended span from both ends, meeting at the center. Jacking members are provided in upper and lower chords at both ends for this purpose, and these members will remain in place after erection but will carry stress only during erection. The total weight of steel in the Grand Coulee Bridge is approximately 1,300 tons, and in the Deception Pass Bridge, of equal span, the steel order amounts to 1,130 tons. The arch bridge will use 465 tons of steel.

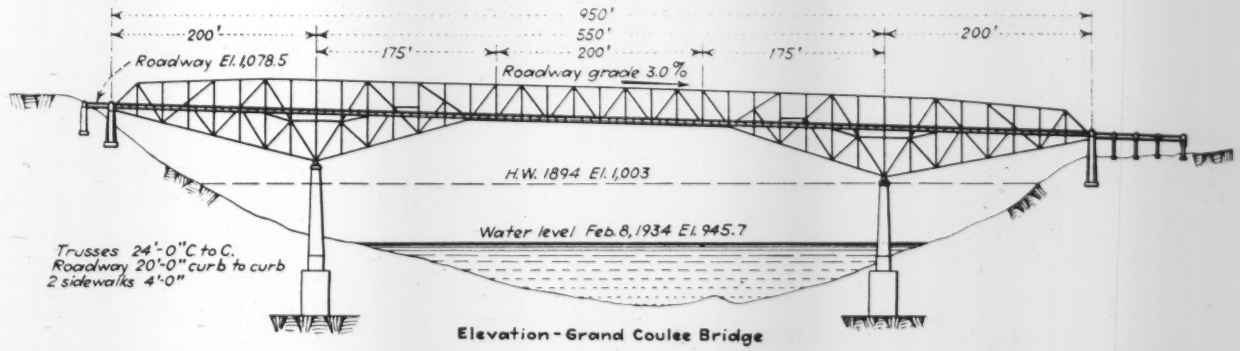
Because the Deception Pass structures are about 180 ft. above channels where swift tidal currents flow, falsework was impracticable, and both spans will be erected by the cantilever principle. The 350-ft. span is designed as a three-hinged arch for dead loads, and after erection is complete the central hinge will be riveted up, making the bridge a two-hinged arch for live load.

The cantilever spans will have all connections riveted except that the suspended spans will be supported at their four corners by pin-connected links to allow for changes in the length due to live load and temperature. However, in all positions these suspended spans will be locked against transverse movement by a shear lock in the bottom lateral system. Pin-connected links at the ends of the anchor arms connect the truss to the anchorage shoe, while upset rods extending into the anchor pier and secured by a grillage transmit the stress from anchorage shoe to pier.

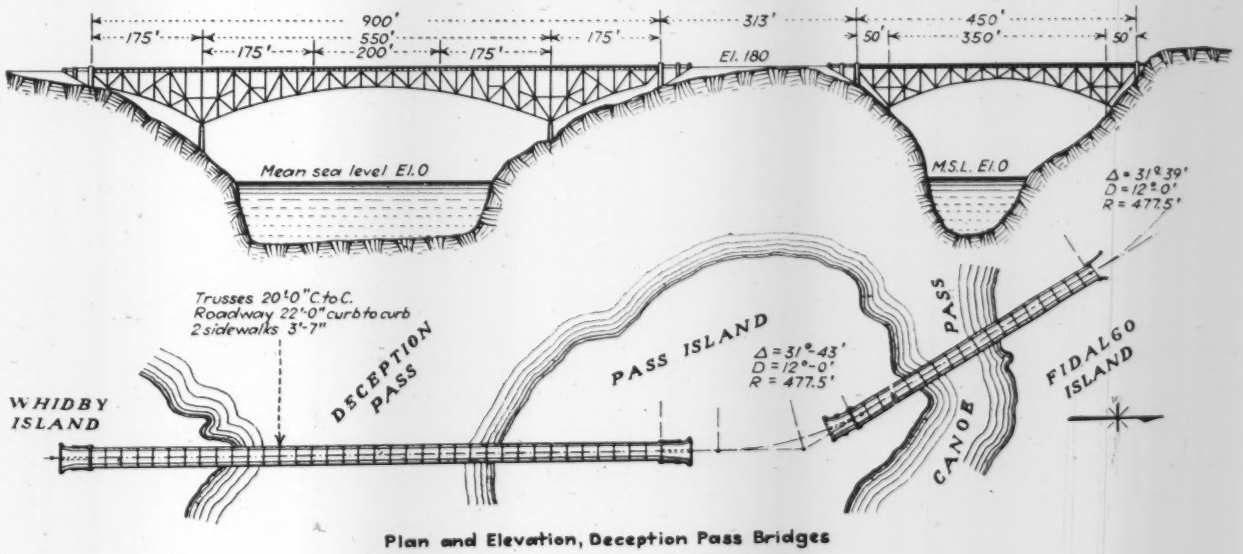
The Deception Pass bridges are under contract to the Puget Sound Construction Co. for a total figure of $304,000. The Grand Coulee Bridge was designed for the Columbia Basin Commission and will be built by the U. S. Bureau of Reclamation in connection with the Grand Coulee project.

Lacey V. Murrow is Washington state director of highways, and O. R. Elwell is bridge engineer.

THREE new highway bridges designed by the Washington state highway department.



Elevation - Grand Coulee Bridge



Plan and Elevation, Deception Pass Bridges

Analysis of Boulder Dam Spillways Made by Swiss Laboratory

Capacity of the side-channel-type structures studied by the Swiss national hydraulic laboratory using an analytical solution checked by a 1:150 scale model test—Method described and results outlined

By Dr. E. Meyer-Peter and Dr. Henry Favre
Laboratoire de Recherches Hydrauliques, l'Ecole Polytechnique Fédérale, Zurich, Switzerland

THE SPILLWAYS for Boulder Dam were designed by the Bureau of Reclamation based on analytical studies checked by 1:20 scale model experiments. The tests were described in *ENR*, Aug. 10, 1933, p. 155, and subsequently the structural design and construction of the spillways were reviewed in *ENR*, Dec. 1, 1933, p. 754.

Because of the unprecedented hydraulic-design problems presented in the building of these spillways, the Swiss Federal Hydraulic Research Laboratory made an independent review, and the resulting information is presented in the accompanying article. No attempt is made, or was obviously intended, to compare one study with the other. The present authors made an independent study of the problem and present interesting hydraulic data. —EDITOR.

THE unusual hydraulic problems involved in the design of the Boulder Dam spillways, built to discharge a floodflow of 400,000 sec.-ft., resulted in an analytic and model study of the problem at the Hydraulic Research Laboratory, Zurich, Switzerland, made at the suggestion of a manufacturer of hydraulic control equipment who was interested in submitting proposals for providing spillway gates. The salient information and data obtained by this independent review of the design problem may be of value to hydraulic engineers.

It is not considered necessary to describe the Boulder Dam project or the spillway provisions, as they have already been reviewed in detail in *Engineering News-Record*. Briefly, the floodflow enters two side-channel spillways, one on either side of the canyon, and is turned 90 deg. to discharge into the inclined spillway tunnel. The highest water level in the reservoir is El. 1232, while the bottom of the diversion tunnel is at El. 640, as far as can be seen from the available plans.

In reference to the dimensions of the spillway channel, several solutions are conceivable, but the importance and magnitude of the structure indicate that the design should be reliable in addition to being as economical as possible. The problem was to design a channel to lead away a quantity of water constantly increasing in the downstream direction and, further, to receive this water from a direction at right angles to the channel. It is only possible to determine an economical solution by calculation if a method is known which allows the position of the water level in a channel of variable cross-section, and with variable quantities of water, to be determined analytically. Further, this solution must take into consideration the great losses of energy that take place as the result of the water entering from the side of the channel.

Julian Hinds has presented a method (Am.Soc.C.E., *Transactions*, 1926) of calculating the elevation of the water surface in the side-channel spillway, considering only the simple case of water entering exactly at right angles to the axis of the channel. Furthermore, the method does not take into account the loss of energy by friction.

In a bulletin of the Swiss Hydraulic Laboratory in Zurich, Dr. Favre develops a general method of calculation in which both of these influences are considered. This new theory is applicable to most cases dealing with variable quantities of water in a channel. This method was applied to four variations of the proposed spillway design for Boulder Dam, and the results obtained by each calculation were further checked by model tests. The calculation method is outlined and the model tests reviewed in this article.

Calculation methods

The method of Dr. Favre leads, in the present problem, to a step-by-step calculation of the water-level curve, based on the differential equation:

$$\Delta Z = \frac{U_m^2}{k^2 R_m^{4/3}} \Delta x + \left(1 - \frac{u^*}{U_m}\right) \frac{Q_2^2 - Q_1^2}{2g \cdot S_m^2} + \frac{U_2^2 - U_1^2}{2g} \quad (1)$$

where

Δx is the horizontal distance between two adjacent sections of the channel selected for the calculation (length of channel under consideration).

ΔZ is the difference in water surface elevation at the beginning and end of the section under consideration. ΔZ is negative when the water level falls in the direction of flow, and positive when the water level rises in the direction of flow.

U_m is the mean value of the velocity of flow.

R_m is the mean value of the hydraulic radius.

S_m is the mean value of the wetted section.

Q_1 U_1 are, respectively, the quantity of water and the mean velocity of flow at the upper end of the section under consideration.

Q_2 U_2 are the corresponding values at the lower end.

u^* is the component, parallel to the direction of flow (axis of channel) of the velocity of the water flowing in at the side.

g is the acceleration of gravity.

k is a coefficient depending on the character of the bed of channel in the formula for steady flow.

It follows, that the first term in the right-hand side of Eq. (1) represents frictional loss, and the second term expresses the part of the drop in water level caused by the change in the quantity of water. Finally, the last term on the right-hand side is equivalent to the influence of the change of velocity on the water level, according to Bernoulli's law.

In this type of calculation a point on the water level must be taken as the initial basis for the solution, and this position is first determined from the constructional and hydraulic characteristics of the system. In the present case there can be no doubt that rapid flow must occur in the lower part of the collecting channel before it passes over into the spillway tunnel. On the other hand, because of the great loss of energy caused by the water entering the channel at the side, this rapid flow will probably not occur in that part of the channel where the quantity of water is being constantly increased. But the change from turbulent to rapid uniform flow occurs at the so-called critical depth, which is characterized by the height of the energy line in relation to the quantity of water flowing in a minimum section. This critical depth h_k is a function of the quantity of water and of the form of cross-section and can therefore be at once calculated for the known flow and the given cross-section directly below the sector gates, from the formula:

$$h_k^3 (b + n h_k)^3 = \frac{Q^2}{g} (b + 2n h_k) \quad (2)$$

where

b is the bottom width of bed at the given cross-section, n is the average of the tangents of the angle of inclination of the sides to the vertical, and Q is the total quantity of water.

One of the variations of the problem submitted to calculation is shown in Fig. 2. Its characteristic features are as follows:

The movable part of the overflow structure consists of four sector gates, each 114 ft. 10 in. long and 26 ft. 3 in. high. The discharge channel has a

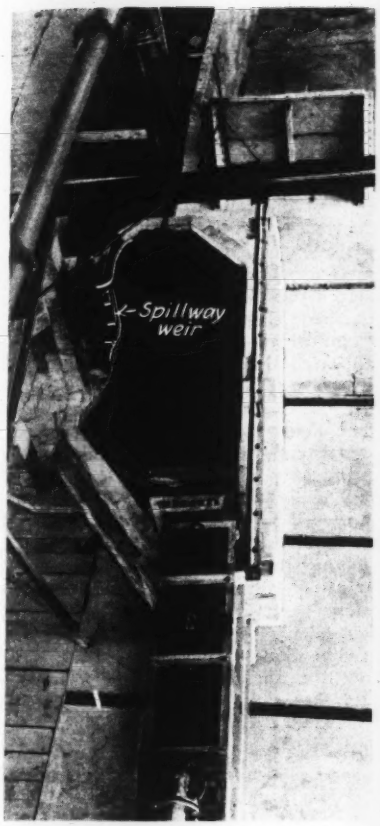


FIG. 1—MODEL-TEST arrangement in the Swiss National Hydraulic Laboratory to measure the characteristics of the Boulder Dam spillways.

constant bottom width of 30 ft.; the bottom slopes from El. 1174 ft. 7 in. at the upper end to 1094 ft. 4 in. at the lower end of the sector-gate weir. The side walls of the channel slope 20:13 at the weir side and 20:7 on the mountain side. Near the lower end there is a gradual change from the trapezoid cross-section to the circular cross-section of the tunnel.

Cross-sections for calculation were taken at the middle of the weir abutments. It should be specially noted that in this problem the water level at the upper end of the channel, where the quantity of water flowing equals zero, must be horizontal.

One essential question to be considered is the extent to which a "banking-up" of the water in front of the sector openings can be permitted without appreciably reducing the discharge capacity of the openings. Here, theoretically, the permissible highest water level downstream of the openings is that which lies at two-thirds of the difference in height between the normal reservoir level and the upper edge of the open sector gates. But, to be conservative, only about half this value is used in the calculation. Accordingly, this gives, for the problem under consideration of Water level in reservoir (dam crest) = 1,232 ft. Crest of open sector gates = 1,205 ft. 9 in. Free height of flow = 26 ft. 3 in. Permissible highest water level in channel = 1,205 ft. 9 in. + ½ (26 ft. 3 in.) = 1,218 ft. 10½ in.

This elevation provides a criterion for the necessary width or depth of the discharge channel. It is evident that the minimum dimensions of the channel can be determined only by repeated trial, and the analytical treatment is of advantage in leading more directly to the desired solution than the test by models.

Checking by models

Purpose of the tests—The model tests were made for the purpose of:

(*a*) Checking the hypotheses required in the calculation, particularly concerning the choice of the cross-section in which the critical depth is to be introduced, verifying Eq. (2).

(*b*) Checking the course of the water level obtained analytically from Eq. (1), noting chiefly the disturbing effect of the water flowing in at the side. The loss of energy in the part of the water directed transversely to the axis of the channel will probably bring about a transverse slope of the water level and also the formation of a screw-like—"roll"—motion of the water. The theoretical considerations neglect the influence of this; its experimental observation is consequently of great importance.

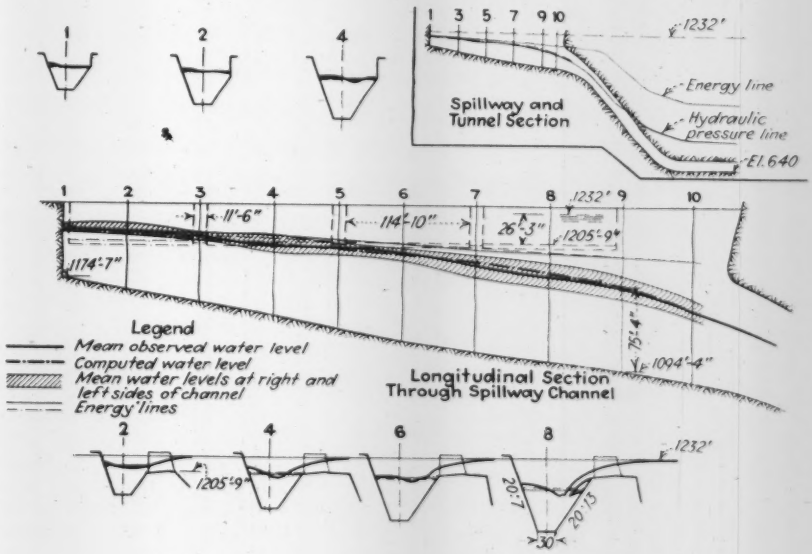
(*c*) Investigation of the flow of the water into the spillway tunnel. It is true that the water level downstream from the lower end of the sector weir can be calculated, but, in addition to the disturbances already mentioned under (*b*), a new phenomenon also occurs in the inclusion of air in the quickly moving water. It is of particular interest to check whether the crown of the tunnel is properly arranged to allow the mixture of water and air to pass without choking or banking up.

(*d*) Studying the capacity for absorption of the spillway tunnel. It is evident that, with the given dimensions and conditions of gradient, the lower part of this tunnel must act as a pressure tunnel. The pressure required to set the given quantity of water in flow in the almost horizontal part of the tunnel cannot be calculated accurately because of the uncertainty as to the quantity of air mixed in the water. The height at which free flow changes over to pressure flow in the tunnel depends principally on the quantity of included air. At the point where there is a sudden change from faster to slower velocity of flow, great losses of energy occur, but they cannot be calculated. The model tests were designed to give information on the position of the change-over, to check the tunnel size.

Research Plant—To keep down expenses, 1:150 scale reduction had to be used for the model, and the resulting uncertainties are discussed at the end of the article. The model represents the spillway on the Arizona side. The set-up for the test is shown in Fig. 1. Tests were run up to quantities corresponding to 200,000 cu.ft. for the prototype. Further, the quantity of water was increased until the tunnel from the spillway was incapable of letting all the water pass away, thereby checking the sufficiency of the tunnel size.

Test Results—The first step in studying the test results was to plot the cross-sections at about ten points along the spillway channel. From the observed water-surface profile the mean level of the water at these sections was determined. In Fig. 2 the several cross-sections shown indicate the observed water

FIG. 2—CHARACTERISTICS of channel flows determined by a model test, showing water surface at a series of cross-sections and the longitudinal profile as observed, compared to the calculated profile.



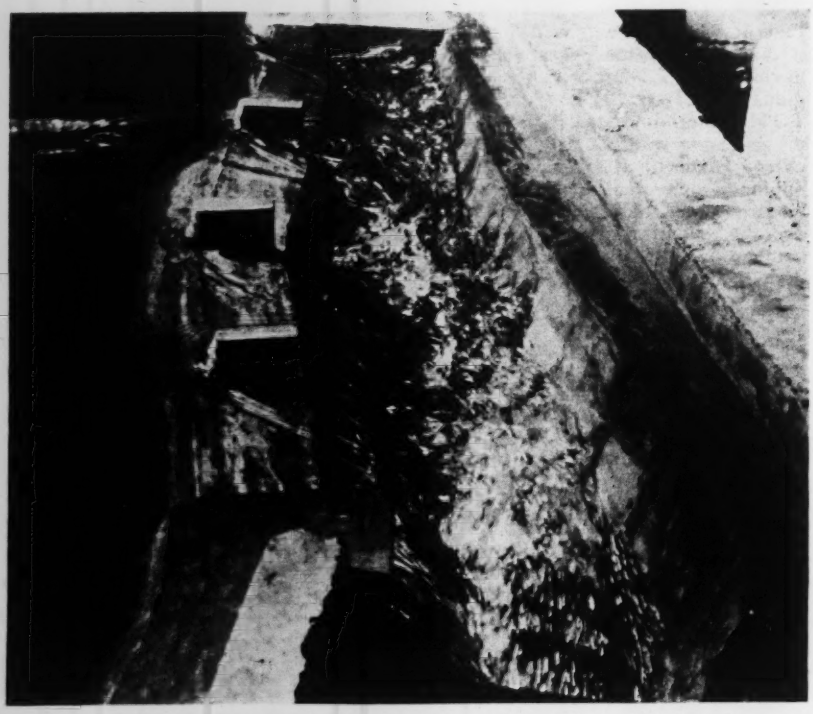


FIG. 3—SURFACE WAVES in the water flowing over the weir, resulting from the disturbance of the gate piers, were visible in all variations of the models tested.

level and the mean water level for the same sections.

The next step was to use this information, obtained from the cross-sections, in a study of the longitudinal profile. The mean water levels at the individual cross-sections were plotted to show the slope of the water surface in the direction of flow. In Fig. 2 this mean observed water level is indicated in comparison with the computed water level obtained by the analytical method already described. A shaded area is also shown, which indicates the water level on the left and right sides of the various cross-sections.

It was gratifying to note the close relation in the calculated and observed water levels. It should be observed that the observed water levels at a point near the downstream end of the spillway are slightly lower than the calculated critical depth, but the two lines converge rapidly both ways from this point.

The adoption of Eq. (2) for the starting water depth and Eq. (1) for the further run of the water level gives quite satisfactory results, in spite of neglect of disturbance factors.

The observations made during the model tests warrant the following remarks. A feature common to all variations of models tested is the formation of clearly visible surface waves at the gate abutments (Fig. 3). However, the good coincidence of the theoretical and measured overall coefficients indicates that it is not a question of detrimental contraction in cross-section, and any modification in the shape of the abutments could hardly be expected to increase the flow to any measurable degree. The quantities of water flowing through the separate gate openings vary only from 2 to 3 per cent from the mean value. The flow through the upstream gate is smaller by this amount, and the flow through the downstream gate is correspondingly greater than the mean value. This observation indicates that the altitude of the bed of the channel is the right one, since this leads to the flow from the upstream gate opening being equal to the limit of the gate capacity.

The maximum quantity of water that can be absorbed by the spillway tunnel without the inlet funnel being choked was found to be 226,000 sec.-ft. This represents a margin of safety of about 11 per cent. The level of the water in the reservoir for this charge was at El. 1,234¼ ft. In this connection it should be mentioned that the diameter of the model tunnel, for constructional reasons, was only 49 ft. 3 in. (according to scale) instead of 50 ft. Further, the conditions of roughness of the surfaces in the model are probably somewhat more unfavorable than in the actual installation.

Because of the small scale of the model, the carrying over of air into the tunnel could only be determined qualitatively. Nevertheless, the phenomenon made itself manifest by fairly great fluctuations in the pressure conditions and in intermittent expulsion of a mixture of air and water. The energy and pressure lines (Fig. 2) were calculated from the pressure measurements and show clearly the great loss in energy in the part where the water passes from the open spillway into the pressure tunnel.

Conclusions

The results of the model tests were found to agree very well with the results of the calculation. The tests conducted with the model, which for reasons already stated was made to a scale of 1:150, cannot claim to have solved the given problem in every particular. First of all, with respect to the technical requirements for a model, it appeared that a somewhat larger scale would have been preferable, particularly because the law of similarity is not fully complied with. Also it must be pointed out that the influence of the included air could only be investigated qualitatively.

The hydraulic laboratory wished by its work to demonstrate principally the suitability of its theoretical method of solving the problem, which permits direct determination by calculating the most economic dimensions of the collecting channel.

The model tests have been carried out with a financial subvention of the Jubiläumsfonds E.T.H., 1930, and the Schweizerische Volkswirtschaftsstiftung Zürich.

Construction Expenditure Data from Maryland

DATA on the volume of construction work and maintenance expenditures carried out in the state of Maryland during the past ten years have been collected in a study made by the Maryland State Planning Commission, under the chairmanship of Abel Wolman. The data have been collected for the purpose of guiding the commission in mapping out a program for the following decade.

The survey indicates that the total expenditure for construction and maintenance has been $197,312,000 in the last ten years, and of this amount $99,621,000 was used in construction and $24,625,000 for maintenance in the city of Baltimore, while the corresponding figures for the counties of the state were $48,256,000 for construction and $24,809,000 for maintenance.

These data for the ten-year period, broken down into several types of construction activity, are listed in detail as follows:

CONSTRUCTION EXPENDITURES

	Baltimore	Counties
Highways	$16,950,266	$8,271,645
Schools	22,780,218	14,702,311
Water	21,548,049	11,843,842
Sewers	19,986,684	9,565,933
Miscellaneous	18,355,776	3,872,957

MAINTENANCE EXPENDITURES

	Baltimore	Counties
Highways	$13,076,032	$19,125,82?
Schools	4,032,346	2,545,720
Water	4,193,908	2,443,000
Sewers	507,800	239,950
Miscellaneous	2,815,213	455,64?

Heat of Hydration of Cement by Simple Apparatus

Inexpensive method for heat of solution determination uses hydrofluoric acid—Comparative data indicate reproducibility of results and agreement with isothermal calorimeter in the order of 1 cal. per gram

By William Lerch
Portland Cement Association Fellowship, Bureau of Standards

THE IMPORTANCE of information on the amount of heat that may be liberated during the hydration of portland cements in mass concrete has provided a need for a rapid and inexpensive method of heat determination. A simplified procedure for determining the heat of solution of annydrous and hydrated portland cement was described by S. C. Pierce and H. McC. Larmour in *Engineering News-Record*, Jan. 25, 1934, p. 114. This method gave indication that satisfactory results could be obtained for the heat of hydration of portland cements by the use of a small and inexpensive calorimeter. The apparatus and procedure as previously described have been modified in this laboratory, resulting in a reduction of the number of operations, a shortening of the time required, and probably an improvement in the precision of the results.

Apparatus described

The apparatus consists of a 1-pt., open-mouth thermos bottle with a cork stopper; a Beckmann thermometer having a range of about 6 deg. C.; a magnifying meniscus reader for the thermometer; a glass funnel; a glass stirring rod bent to an L; and a small motor, provided with a means for controlling the speed, to drive the stirrer. An analytical balance is required for weighing the samples, and a torsion balance, accurate to 0.2 grams, for weighing the calorimeter and solvent. The total cost of the apparatus outlined, exclusive of the balances, should not exceed $60. The assembly is shown in the accompanying illustration.

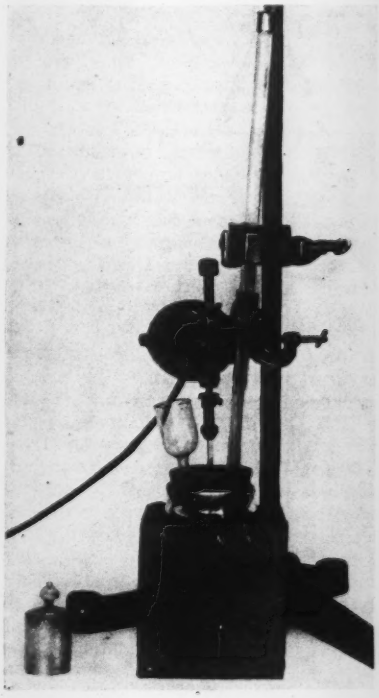
The glass-rod stirrer is bent to give a stirring arm about 1 in. long and is flattened at an angle of 45 deg. to form a propeller. The stirrer extends almost to the bottom of the thermos bottle, and a satisfactory stirring speed is about 400 r.p.m.

The stirrer, the immersed section of the Beckmann thermometer and the interior of the thermos bottle are coated with a resin (Vinylite, 0110 solution) diluted with an equal quantity of acetone to protect the glass against hydrofluoric acid. However, any material that will adhere to glass and protect it from attack by the acid mixture will serve equally well. The coating is applied and allowed to dry overnight at room temperature. When breaks appear in the coating, the old film should be removed and a new coating applied.

The Beckmann thermometer should be so adjusted that the upper range of the thermometer approximates room temperature.

A mixture of nitric and hydrofluoric acids is used to dissolve the cement and the hydrated pastes. A large batch of about 2.0 N HNO_3 is prepared, using 127 ml. of 70 per cent (sp.gr. 1.42) HNO_3 per liter. It is not necessary to standardize the solution, but the heat capacity of the system should be determined each time that a new batch of nitric acid solution is prepared. The hydrofluoric acid is added when the calorimeter sample is prepared, using 8 ml. of 48 per cent HF for each determination.

LOW-COST CALORIMETER set-up for determination of heat of hydration of cement by heat-of-solution method.



Heat-capacity determination

The heat capacity of the system is determined by observing the temperature rise obtained on dissolving 7 grams of ignited (700-800 deg. C. for one hour) zinc oxide. For calculating the heat capacity, the value 257 calories per gram was used as the heat of solution of ignited ZnO in this solvent. About 400 to 450 grams of solvent should be used for all determinations.

A quantity of the nitric acid solution is cooled to the temperature corresponding to the lower range of the Beckmann thermometer and placed in the thermos bottle. Hydrofluoric acid (8 ml.) is added, and then additional nitric acid to give the desired total weight of solvent. The cork stopper, through which pass the stirrer, the funnel and the thermometer, is then properly seated. The lower end of the funnel stem should extend as much as $\frac{1}{8}$ in. below the lower surface of the stopper and should be as much as $\frac{1}{2}$ in. above the level of the liquid. The stirrer should have sufficient freedom of motion to prevent contact with the stopper. The motor is then started, and the stirring is allowed to continue for about 5 min. to attain uniform temperature distribution.

The initial temperature is then estimated and recorded to 0.001 deg., and the introduction of the zinc oxide through the funnel is begun immediately. The time required for introducing the sample is 1 to 2 min. Temperature readings are taken at 5-min. intervals until the temperature change between two successive intervals is constant. The time required for complete solution of the sample varies from 10 to 20 min. If small temperature changes occur after complete solution of the sample, due to stirring or heat leakage, the temperature rise due to heat of solution is corrected for these changes. Thus, if the time for complete solution is 20 min. and the temperature rises 0.005 deg. in each 5-min. interval thereafter, 0.020 deg. is deducted from the temperature rise attained in 20 min. The heat of solution of 7 grams of ZnO divided by the corrected temperature rise gives the heat capacity of the system in calories per degree centigrade.

When the calorimeter is opened at the completion of the determination, observations should be made to determine that not more than a trace of the sample adheres to the stem of the funnel or to the cork stopper. If this occurs, the test should be rejected.

Testing procedure

A 3-gram sample of cement or an equivalent quantity of hydrated cement (on the ignited weight basis) is used to determine the heat of solution. The procedure for determining the heat of solution of the cement or the hydrated cement is the same as that for determin-

ing the heat capacity of the calorimeter. The time required for complete solution, which will vary with different cements, is about 10 to 25 min.

The temperature rise obtained on dissolving the cement must be corrected for the heat of stirring, as already described. The corrected temperature rise, multiplied by the heat capacity of the calorimeter, gives the heat of solution of the 3-gram cement sample. This is converted to the heat of solution per gram of cement.

Since the partly hydrated cement contains a considerable quantity of water, an additional correction must be made for the heat required to change the temperature of this water from room temperature to the final temperature of the calorimeter. Thus, if the room temperature is 25 deg. C., the final temperature of the calorimeter 26 deg. C., and the partly hydrated cement sample (which was introduced to the calorimeter at room temperature) contains 1 gram of water, then one calorie will have been required to raise the temperature of this water from room temperature to the final temperature of the calorimeter. Hence one calorie should be added to the previously calculated heat of solution of the hydrated cement sample.

The quantity of dry, unignited cement contained in the damp calorimeter sample is computed from ignition tests on corresponding dry and partly hydrated samples. This quantity is used as a divisor in place of the actual weight of the calorimeter sample for computing the heat of solution of the partly hydrated cement from the total heat of solution determined in the test.

The heat of hydration of the cement is then obtained by subtracting the heat of solution of the partly hydrated cement from the heat of solution of the original cement.

Comparative results

The heats of hydration of nine commercial cements have been determined on similar specimens both with the outlined thermos-bottle procedure and with the National Bureau of Standards isothermal calorimeter. (Specifications No. 566 for Boulder Dam, published by the U. S. Bureau of Reclamation, 1934, p. 28-35.) The results obtained are given in the accompanying table. It may be observed that the largest discrepancy in results obtained between the two methods was 2.6 calories per gram (cement No. 7), which is a difference of about 5 per cent. With the other eight cements, the values obtained by the two methods did not differ more than 2 per cent. Where duplicate determinations were made with the thermos-bottle calorimeter, the agreement between the maximum and minimum values was of the same order as the agreement of comparative values that was obtained with the different calorimeters.

COMPARATIVE VALUES OF HEAT OF HYDRATION OBTAINED WITH THE BUREAU OF STANDARDS CALORIMETER AND WITH THE THERMOS-BOTTLE CALORIMETER*

All Values Expressed in Calories Per Gram

Cement No.	Thermos-Bottle Calorimeter Values: Max. Value	Min. Value	Aver.	Bur. Standards Calorimeter: One Determination	Difference
1	One determination		89.2	89.8	— .6
2	"	"	63.0	62.6	+ .4
3	"	"	107.0	107.7	— .7
4	"	"	87.2	88.9	—1.7
5	66.0	65.2	65.6	65.6	0
6	66.5	65.8	66.1	65.7	+ .4
7	51.8	50.7	51.2	48.6	+2.6
8	61.5	60.7	61.1	62.3	—1.2
9	52.3	49.4	50.8	49.9	+ .9
				Probable error	± .9

*The samples of cement and partly hydrated cement used in this investigation, and the heat of hydration values as obtained with Bureau of Standards' isothermal calorimeter were obtained through the courtesy of F. B. Hornibrook, Bureau of Standards.

Using the isothermal calorimetric values as the basis of comparison, the probable error of the modified thermos-bottle values, as computed from the data presented, is slightly less than one calorie per gram.

It should be noted that these comparative values are obtained by using the same samples of cements and of partly hydrated cements. Thus, the values given may be used for a direct comparison of the two calorimetric methods. Other variables involved in the determination of the heat of hydration of cement, such as the selection of the cement sample, the preparation of the specimens, the differing rates of hydration of different specimens, etc., are not involved in these data.

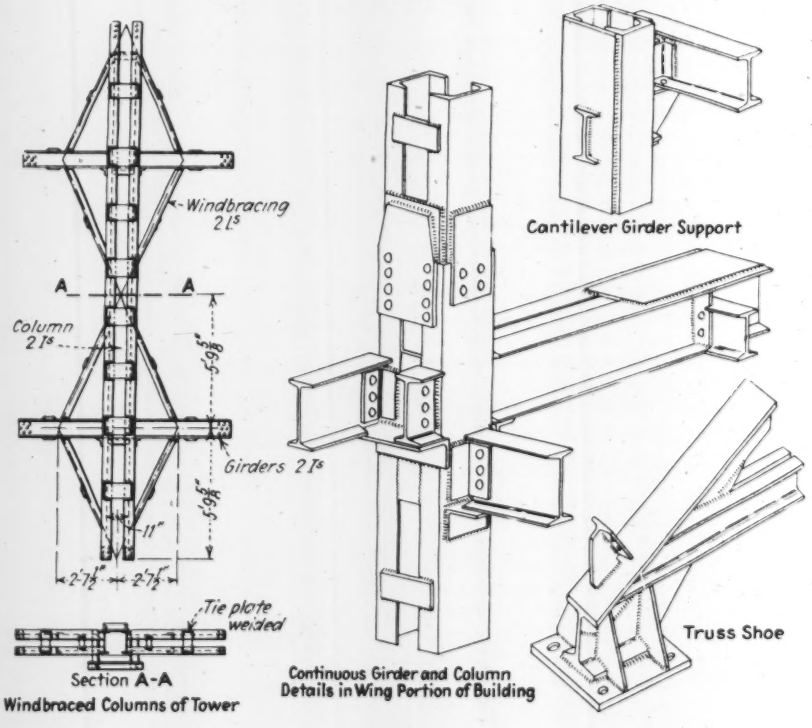
The results obtained with the simple, inexpensive thermos-bottle calorimeter appear to be reproducible and in good agreement with values obtained with the National Bureau of Standards isothermal calorimeter.

Welding Used Extensively in Tall Apartment House in Poland

By Prof. Stefan Bryla
Technical College, Lwow, Poland

IN CONSTRUCTING the Prudential House in Warsaw, the highest apartment house in Poland and the second highest in Europe, all shop work was done by arc-welding while the field joints were riveted. The building consists essentially of a seventeen-story tower, 220 ft. high above the street and 54x72 ft. in plan, flanked on either side by five-story wings, which extend back a

FIG. 1—TYPICAL WELD DETAILS in the Prudential House, an apartment building in Warsaw.



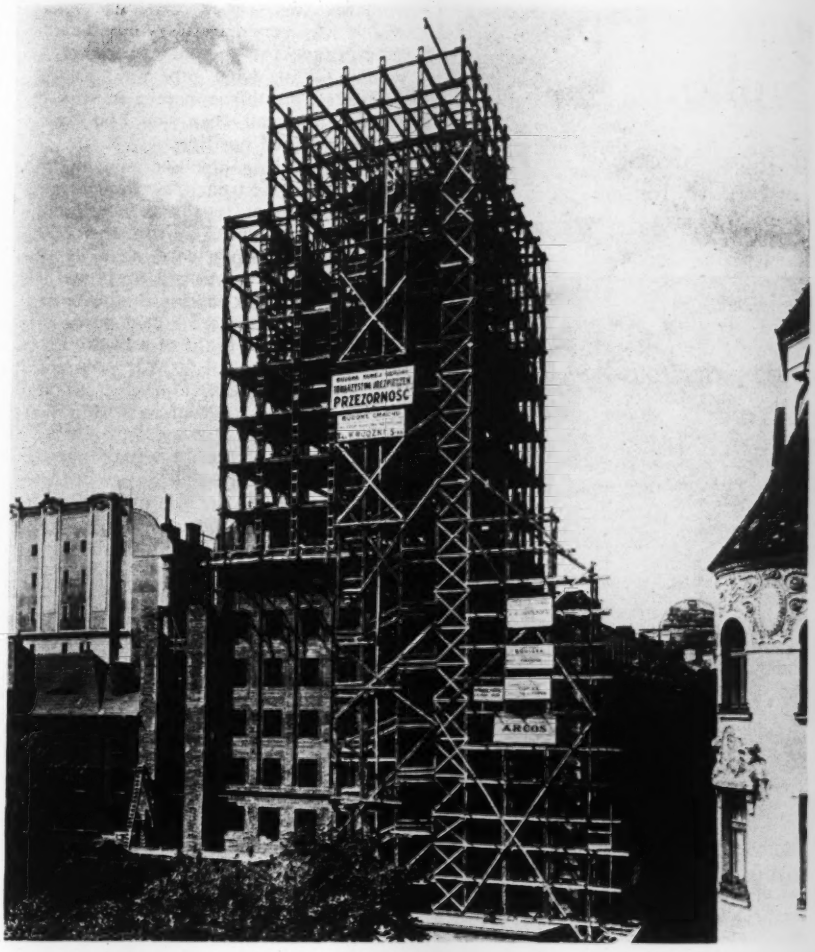


FIG. 2—SHOP-WELDED and field-riveted, this structure is the tallest apartment house in Poland.

distance of 179 ft. The total width across the front of the building, including towers and wings, is 109 ft. The structure required 1,075 tons of steel, of which 560 tons was used in the tower. The first two stories are faced with a pink-gray granite, while the remainder of the building is faced with a sandstone. In the accompanying photograph only the brick backing for this facing is in place. The heaviest load on an interior column is 280 tons, while the heaviest load on an exterior column, including wind, is 313 tons.

The tower and the wing portions of the building are completely separated by an expansion joint. In the tower, special windbracing was required only in the north and south walls, perpendicular to the front of the building. Because of uncertainty as to the eventual layout of the floors, windbracing could not be used on interior columns, while on the exterior columns it had to be arranged so as not to obstruct windows. A K-type bracing, therefore, was utilized, with the point of intersection at mid-story height, on the axis of the columns.

The wind pressure was assumed as follows: up to a height of 50 ft., 10 lb. per sq.ft.; then increasing lineally, reaching 30 lb. per sq.ft. at a height of 100 ft., and continuing at this figure to the top of the building.

The make-up of the tower columns is, in general, two I-beams connected by means of welded straps; in the upper stories and in the wing portions, channels are substituted for the I-beams. Offset girders are required over the street entrance and at the fifteenth floor; these girders consist of pairs of rolled beams joined by welded diaphragms. In the five-story part the girders are chiefly continuous, being led through the columns between the channels and resting on angles and on coverplates welded to the channels. The girders are, in general, placed in pairs because of the small depth available. Off-center girders are also to be found in the frame, especially on the outside wall. Such a construction is shown in one of the accompanying details where an I-beam is inserted into holes cut in the web of the column by means of an oxy-acetylene flame and supported on the far side by an angle welded to the column. The girder that rests on this I-beam bracket also has a welded attachment to the column web.

In the outside walls extensive use is made of cork insulation applied in ¾-in. strips stuck on the inside face of the backing. Floors are relatively thin, to reduce the dead load. In the tower, precast concrete floor beams are used, spaced apart by sheet-iron boxes upon which concrete was poured to form the monolithic floor. In the wing portions of the building similar precast beams are used, but the sheet iron is replaced by hollow tile made of a mixture of concrete and sawdust. The fill concrete is also of this special mixture.

A part of the building area immediately behind the tower, measuring 40x40 ft., is covered with a glass roof supported by eight half-trusses meeting at a central point. A detail of the end of one of these shop-fabricated trusses is shown in the accompanying drawing.

Effect on the Eyes of Sodium-Vapor Lighting

THE INVESTIGATION made under the supervision of the Port of New York Authority to determine whether the yellow light of sodium-vapor lamps adversely affects the eyes of persons performing clerical work under this light as compared with a tungsten light (*ENR*, Feb. 22, 1934, p. 258), were completed with the following conclusions:

1. Sodium light had no permanent effect upon the eye, either beneficial or detrimental, which could be detected by the clinical tests used, in a group of subjects performing intensive clerical work under this light for about four hours a day during a period of twelve weeks.

2. A temporary contraction of the form field of about 10 deg. on the temporal side was observed for most of the subjects under both the tungsten and sodium lights when the examination was made during the working hours of the subjects. This contraction of the form field, however, disappeared when the subjects refrained from any work requiring convergence for 48 hours.

3. No significant difference in the amount of work performed by the sodium and tungsten groups was observed.

During the greater part of the time the illumination on the working plane was maintained between 9.5 and 10.5 foot-candles. The illumination was semi-indirect and unusually free from glare. All of the persons upon whom the tests were performed stated that, while they recognized the complete lack of color contrast in the sodium light, they liked the light, characterizing it as soft and easy on the eyes.

Placing 40-Ton Concrete Pipe in Little Morongo Siphon

Novel methods employed to set in place precast concrete sections 12 ft. in diameter and 12 ft. long —One of 150 siphons on Colorado River Aqueduct

PIPE SECTION sliding down the rails to its place in the siphon. Crane at top lifted it from the car on the ramp track at the right up which it was hoisted from the casting yard.

PRECAST concrete pipe sections of unprecedented size recently have been manufactured in a desert location on the route of the Colorado River Aqueduct and there assembled to form the Little Morongo siphon. Although this is only one of 150 siphons included in the plans of the Los Angeles Metropolitan Water District, it is of special interest because it was undertaken largely as an experiment to determine: (1) the feasibility of moving and placing precast pipe sections of such great size and weight; and (2) the comparative advantages, particularly cost, of precast and monolithic types. Each of the precast sections is 12 ft. in diameter, 12 ft. long and weighs about 40 tons. Their design and manufacture, including description of reinforcing by steel cylinders as well as with steel bars, details of lead gasket joints and other features were covered in *ENR*, July 12, 1934, p. 333.

The function of this siphon, which is located about 26 miles east of Banning, Calif., will be to connect two tunnel portals that overlook and are separated by Little Morongo Canyon. The total length of the siphon is 723 ft.; the maximum head 118 ft. For about 400 ft. the bottom of the canyon is at approximately level grade, so the siphon consists of this flat section and two inclined portions extending up the canyon walls. The incline connecting with the tunnel portal on the west has a maximum slope of 45 deg., and the one on the east is 37 deg.

The pipe sections were cast on the bottom of the canyon close to the site selected for the siphon. In working out the construction plan every possible advantage was sought for the most difficult part of the operation, which was admittedly the handling and exact placement of the sections.

Across the bottom of the canyon a trench 20 ft. wide on the bottom with ¼ to 1 slopes and 24 ft. deep was first excavated, with its center line on the prescribed location for the siphon. On the canyon-side slopes, where the excavation was mostly in rock, the trench was made of just sufficient depth to permit the specified 3-ft. minimum cover over the top of the pipe. All excavation was done with a dragline operated by a locomotive crane on crawlers. The same machine was used later on for lifting and placing the pipe sections.

After the completion of the trench, a track of 4½-ft. gage was laid in its bottom, using 60-lb. steel rails supported on steel ties set in concrete ballast which was very carefully placed to the exact grade for the under side of the siphon. Thus when pipe sections were supported on this concrete on the designed alignment, they would be exactly in the specified position.

For delivering pipe sections into the level part of the trench, two ramps were excavated down to the trench bottom at convenient points. From their position in the casting yard near by, the pipe sections were tipped over on their sides, pulled by a tractor to the nearest ramp, and there were rolled down into the trench in the bight of a cable. From the ramp they rolled directly onto a car on the 4½-ft. track, and the car was pulled along the trench to within 1 ft. of the last pipe section laid. At this point the section was lifted from the car by a gantry crane spanning the pipe, and after the car had been removed, the pipe section was lowered directly onto the rails. Two 25-ton jacks, working against brackets clamped to the rails, slid the pipe longitudinally into place against the adjacent section.

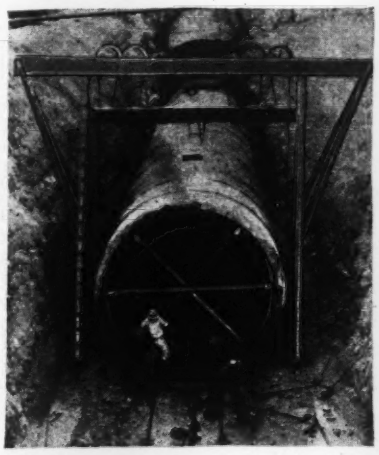
After the level portion of the siphon had been laid, a vertical angle section, consisting of a steel cylinder bend with joint rings attached, together with the outside reinforcing cages, was set at the toe of each of the slopes. A section of straight pipe was then placed by the crane, immediately above the bend, and an exterior coating of concrete around the bend was cast in place. Meantime tramways were built on each side of the canyon from the bottom up the slope to a point near the upper end of the inclined portion of the trench. When the vertical-angle sections of the pipe had been cured properly, the next section to go in the side slope was hoisted to the top of the tramway with a steam hoist, transferred from the tram car to the trench track by the locomotive crane, and then allowed to slide down the track to within 1 ft. of the last section laid.

For convenience in handling the sections on the tramway and in lowering them down the inclined track, a sling was designed to attach the hoisting line to the section. This sling had to be removed before the pipe could be entered, and this was done by holding the section in place with blocks while the hoist cable was transferred from the sling to a bridle fastened to the pipe with clevises. The clevis pins worked in 2-in. pipe cast in the bell, at the ends of the horizontal diameter and welded to the joint ring about 5 in. from the end of the pipe. After the section was in place, the hole in the steel joint ring was closed by welding, and the pipe was filled with cement mortar.

On a pipe of so large a diameter, it was thought desirable to give particular attention to the joints—a vital factor in any type of pressure-pipe construction. On this job joints consisted of specially shaped steel bands welded onto the steel cylinder for the higher

heads and onto the longitudinal steel for the lower heads. Before these steel joint rings were assembled with the steel reinforcement, they were stretched by a hydraulic press past their elastic limit to form them into perfect circles. Thus when the pipe was laid, these joint rings telescoped and provided an exact and uniform calking space between them. Into this space a special-shaped lead gasket was driven from the inside of the pipe after each section had been set accurately in place.

The concrete cradle supporting the pipe over a 90-deg. arc was poured in



LAYING PIPE in level portion of siphon. Gantry lifts each section from the car and lowers it to the rails, after which it is slid into place by horizontal jacks.

lengths of about 100 ft., pouring being carried on simultaneously on either side of the pipe. The cradle was cured for ten days, after which the trench was backfilled to grade. The second calking of the lead gasket followed the backfilling and was done by two men with a heavy calking tool and an 8-lb. sledge. The final calking was done a few days later by one man using a 4-lb. calking hammer.

After the calking was finished, the narrow space on the outside between the pipe sections was poured full of cement grout; the inside joint space was filled with mortar applied with a cement gun, and the mortar immediately was troweled off smooth and flush with the inside of the pipe. The 2-in. inside lining of all bends also was placed with the cement gun and troweled off smooth while the mortar was still fresh, using a circular templet to insure a true circular cross-section throughout the bend. There were four vertical and two horizontal curves on the line, with angles varying from 8 to 45 deg. The radius of all curves on center line was 2½ diameters, or 30 ft.

To test the completed siphon, light metal diaphragms were welded to the end rings on either end of the siphon and were backed by cross-timbers braced to the trench ends. Each diaphragm had an air vent and valve near the top; water to maintain the pressure was fed from a tank and measured through a meter. Water was furnished from the construction water-supply line installed by the district.

The specification limited the leakage to 15,000 gal. per mile of pipe per 24 hours, or about 104 gal. per inch of diameter. The actual leakage in the siphon in a 24-hour test, prior to official acceptance of the contract, amounted to 92 in.-gal. A considerable part of this apparent leakage was the taking up of moisture by the pipe, because some 30 days later, after standing full of water, a second test showed a much lower figure.

The joints used were the "Lock Joint" lead and steel type; they were furnished to the contractors by the district and will be similarly provided for all precast reinforced-concrete pipe used on the aqueduct.

Contractors and engineers

The contractors on the job were the United Concrete Pipe Corp. and the American Concrete & Steel Pipe Co. H. H. Jenkins, vice-president of the latter company, was in charge, with C. A. Meade as superintendent.

F. E. Weymouth is general manager and chief engineer of the Metropolitan Water District. J. B. Bond is construction engineer, and R. B. Diemer is division engineer of Division 4 in which Little Morongo siphon is located.

Status of Railway Construction Undertaken by Persian Government

RAILWAY construction on a large scale was undertaken by the Persian government in 1928, but the project ran into difficulties and since 1930 has been carried on at a reduced rate. The present status of the work is taken from a statement transmitted by the American Vice-Consul, Raymond A. Hare, Teheran, Persia, to the machinery and agricultural implements division of the Department of Commerce:

Up until recently Persia was a country without railways except for the Tabriz-Julfa Railway (80 miles in length with a branch line of 30 miles from Sufian to Urumia), the Teheran-Shah Abdul Azim Railway, a narrow-gage line connecting Teheran with a favorite Moslem shrine six miles distant, and another narrow-gage line owned and operated by the Anglo-Persian Oil Co. for its own exclusive use.

Projects for other railways in Persia had been made on numerous occasions, but all proved abortive until 1928 when a contract was signed by the Persian government with a mixed foreign group known as the Persian Railway Syndicate. According to these terms two trial sectors were to be built, one of 250 km. from Bandar Shapur on the Persian Gulf to Salehabad, and another of 128 km. from Bendar Shah on the Caspian to the town of Shahi. Participating in the syndicate were two groups known as the "American group" which undertook construction of the southern sector, and the "German group," which undertook construction of the northern sector. The former encountered certain difficulties in 1929 which led to the cancellation of its contract in May, 1930. The German group continued construction and completed its sector in 1931.

For the following two years construction was carried on at an attenuated pace by the Persian Railway Administration, using American engineers in the south and Swedish engineers in the north. During this period work was undertaken but not completed on a 62.3-km. sector south of Shahi and one of 50 km. north of Salehabad.

This second phase of construction ended on April 16, 1933, when an agreement was signed with the Consortium Kampsax, a Danish-Swedish group, by virtue of which the latter was engaged in the capacity of consulting engineer to superintend completion of the remaining 950 km. from Shahi to Salehabad via Teheran. The line to be completed was divided into two parts, a northern section from Teheran to Shahi (350 km.), to be completed in four years, and a southern section from Salehabad to Teheran (600 km.), to be completed in six years. An initial 2½-year program was planned immediately which called, first, for the completion of the unfinished sectors and, second, for new construction on both the northern and southern sections. The line to be constructed was divided into lots and bids solicited. Up to the present time contracts have been awarded to nine firms of various nationalities on eleven lot numbers in the north and south sections.

Most of the machinery used on this work is shipped to Mohammerah on the Persian Gulf, from which it goes by water to Ahwaz, by train to Salehabad and by motor truck to its ultimate destination. The trans-desert route via Beirut (Syria), Baghdad (Iraq) and Kermanshah and Hamadan (Persia) is much faster but is too expensive for heavy articles unless time is at a premium.

Sealcoat-Type Road Surfaces in Los Angeles County

Secondary roads of thin light-oil-and-rock wearing surfaces—Smoothness and cost of three types compared—Patching methods and equipment—New type of cold or hot asphalt distributor

By W. W. Shelby
District Engineer, County of Los Angeles Road Department, Los Angeles, Calif.

WITH ROAD SYSTEMS often of several thousand miles, many metropolitan counties require a highway department organization and carry on road construction and maintenance operations scarcely less in magnitude than those of state highway departments. Among these county roadbuilding departments that of Los Angeles County, California, has been notable for its invention of methods and equipment. In the following article, engineers are given an authoritative account of the sealcoat-type surfacing adopted widely during the past few years and of the methods and equipment developed for its cheap construction. The article bristles with facts which will appeal to all roadbuilders. —EDITORS.

THE LOS ANGELES County Road Department maintains approximately 4,200 miles of highways located in the unincorporated areas of the county. A portion of the activities of the maintenance division, including methods, costs and machinery used, are here described and analyzed. All county maintenance is supervised by one engineer. Under him are district engineers, who are in charge of definite areas. This article applies in all respects only to some 1,200 miles in the Compton section, the maintenance of which is directed by the author. This area is more or less equally divided into eleven districts, each being operated by a road foreman.

Definition and scheduling

For the purposes of this article, No. 3 crushed rock is that which passes a ¾-mesh and is retained on a ½-mesh screen, No. 4 crushed rock passes a ½-mesh and is retained on a 10-mesh screen, and 90 oil is a refined road oil containing 90 to 95 per cent of 80-penetration asphalt. The average rock cost is $1.41 per ton, and oil costs, after heating, approximately 5c. per gal. f.o.b. on trucks. The wage of common labor is $4.50 per day.

The light rock-and-oil wearing surfaces may be classified as follows: (a) premix, ¾ in. thick; (b) No. 3 macadam, ¾ in. thick; (c) No. 4 macadam, ½ in. thick; and (d) macadams sealed with emulsions. The numbers of these so-called macadams, which are nothing more than light seal coats, are those of the maximum size of rock used in their construction.

Each year a schedule is made of all work to be done in each road district. This includes the type of improvement, the limits and widths of work to be done on each street, the quantity of materials needed and the account to which each project is to be charged. This information is given to each road foreman. A schedule of dates is then posted so that each of the eleven foremen knows when to expect the machinery needed to perform the work. The accompanying sample of the work schedule for a portion of District 113 illustrates the completeness of the information furnished the field.

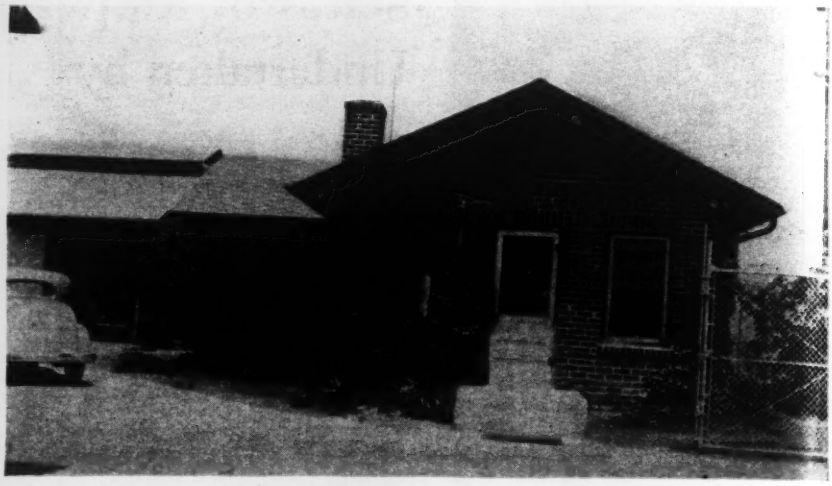


FIG. 1—MAINTENANCE OFFICE at Compton, one of the district offices from which is directed the upkeep of the 4,200 miles of roads in Los Angeles County, California.

Types of surfacing

Premix—This is a plant mix made from 90 road oil and a properly graded aggregate. For ¾-in. thickness No. 4 rock is the largest size used. This mix is a development of recent years. It is heated to about 200 deg. F. This type of material is widely used locally, as it can be worked any time during the day it is mixed and can be spread by ordinary road graders. While a tack coat on the subgrade is not essential, we prefer it, and use ¼ pt. (1/32 gal.) of 90 oil per square yard. This small quantity of oil is spread by raising the header of the pressure distributor and closing alternate nozzles. With a wearing surface only ¾ in. thick, this oil prevents the material from shoving under the blade during construction, in addition to performing the usual functions of a tack coat.

The plant mix is hauled to the job and spread in a thin layer on the subgrade directly from the trucks; it is then spread by power graders and rolled (Fig. 2). Intersections are raked by hand.

In order to secure a uniform thickness of edge where no curbs exist, a shoe is attached to the end of the blade; this shoe runs on the subgrade and is adjustable for height, so that any desired thickness of material may be spread. If the street is curbed and the curb grade is reasonably true, a wheel is attached to the end of the blade. This wheel running on top of the curb gives a spread of material paralleling the top of the curb grade and hence an even flow line.

The amount and cost of this type of work done in the Compton district during the last three years are shown by Table I. It will be noted that while the total cost varies with the price of material, the laying cost has been annually reduced. It is thought that any further reduction in the field cost would be at the expense of the quality of the work and therefore not warranted. The pre-mix equipment consists of one three-wheel 13-ton roller, one 8-ton tandem roller, two power graders, two 1½-ton dump trucks, one water truck and the crew of one timekeeper and accountant, one foreman and ten men. The same men annually comprise the crew, and all work of this type is done by them regardless of road district boundaries. A day's work on city streets, where intersections are numerous and graders are forced to turn frequently, is 600 tons, while on rural roads it is 900 tons.

This wearing surface (Fig. 2) for riding qualities is surpassed by none. The pre-mix surface has the unique quality of becoming smoother under traffic. For example, a stretch of this material ¾ in. thick, was laid over an old pavement which had a smoothness rating of 393 as determined by a vialogue. This rat-

TABLE I—MILEAGE AND COST OF PREMIX WEARING SURFACE

9 Lb. Per Square Foot

	1932	1933	1934
Total miles 20 ft. wide	81	86	61
Tons per day	600	630	750
Cost per ton-labor, equipment, etc., cents	0.29	0.22	0.18
Cost per sq. ft.—labor, equipment, etc. cents	0.13	0.10	0.08
Cost per sq. ft.—materials, cents	1.22	1.02	1.15
Total cost per sq. ft., cents	1.35	1.12	1.23
Cost per mile—20 ft. wide	$1.420	$1.180	$1.300

ing is obtained by adding to the number of $\frac{1}{8}$-in. irregularities per mile twice the number of $\frac{1}{4}$-in. irregularities and three times the number of $\frac{3}{8}$-in. irregularities. Immediately after laying, this surface had a rating of 43.2, seven months later a rating of 28.5, and three months later a rating of 27. The smoothness of premix is thought to be the result of the long wheel base of the power graders.

This type of surface is being widely used to restore the riding qualities to old macadams. It is also successfully used to resurface badly cracked main arteries. Three years ago this material, $\frac{3}{4}$ in. thick, was used to cover an old, rough and checked squeegee-covered concrete highway, much of the oil having peeled off. It is very smooth and without a patch today. It is also used by us as a wearing surface on secondary roads where the subgrade is now satisfactorily carrying its traffic but is approaching the costly maintenance stage. After a few years of service the life of this type of surfacing is often prolonged by adding a thin layer of the same material or by sealing with 90 oil and No. 4 rock.

No. 3 Macadam—This $\frac{3}{4}$-in. thickness of rock and oil has been and still is being widely used as a wearing surface. It consists of a tack coat of $\frac{1}{4}$ gal. of 90 oil per square yard covered with 5 lb. of No. 3 rock per square foot. This is followed by another quart of 90 oil and a covering of 3 lb. of No. 4 rock per square foot. There are approximately 725 miles of this type of covering in the county; a mile, 20 ft. wide, costs approximately $1,000.

Details of costs and quantities used are given in Table II. This table shows work done in nine different road districts and therefore by nine different road foremen. It is interesting to note the different amounts of material used to perform the same work. This difference is considered to be due to the custom and ideas of the individual foreman and not to difference in subgrade conditions.

No. 4 Macadam—This thin layer of surface, approximately $\frac{1}{4}$ in. thick, consists of a tack coat of $\frac{1}{8}$ gal. of 90 oil per square yard, covered by 3 lb. of No. 4 rock per square foot. It is best suited for secondary roads, whose subgrades are satisfactory for the conditions imposed upon them, but which easily corrugate or ravel under traffic, such as an old oiled earth surface or unoiled cementatious gravel. It fur-

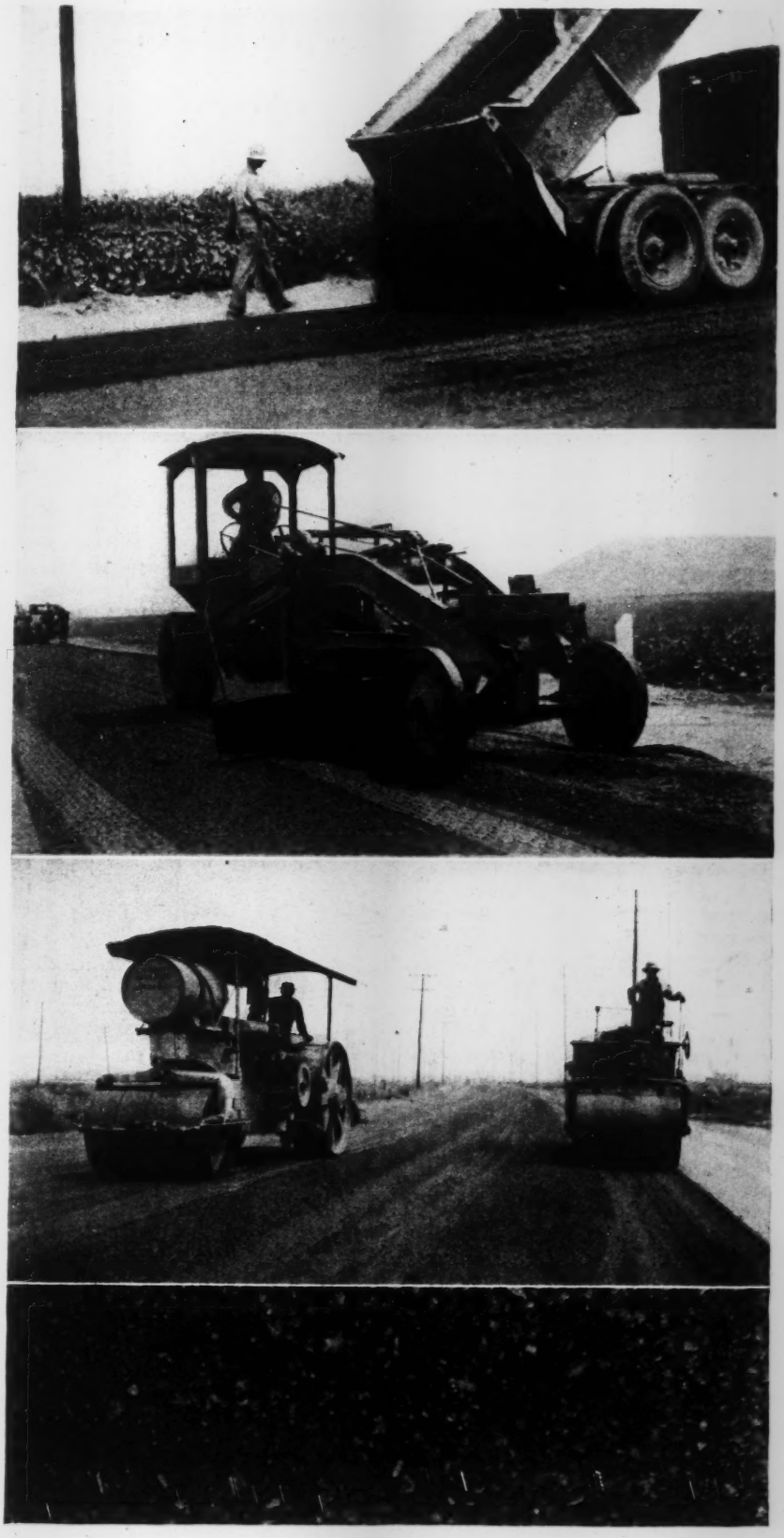


FIG. 2—OIL AND STONE PREMIX, largely used for sealcoat-type surfacing of Los Angeles County roads, gets its economy largely from mechanization of the construction processes.

TABLE II—COSTS OF NO. 3 MACADAM ROAD SURFACING AS OBTAINED IN WIRE ROAD DISTRICT AND BY NINE DIFFERENT FOREMEN

Dist.	Square Footage: Total	Square Footage: Per Day	Lb. Rock per Sq. Ft.: No. 3	Lb. Rock per Sq. Ft.: No. 4	Lb. Rock per Sq. Ft.: Total	Gal. Oil per Sq. Yd.	Cost Rock per Ton	Cost—Cents per Square Foot: Labor & Equip.	Cost—Cents per Square Foot: Materials	Cost—Cents per Square Foot: Total
101	153,400	77,000	5.2	3.6	8.8	0.55	$0.90	0.08	0.71	0.79
113	610,000	87,000	5.8	3.4	9.2	0.43	1.43	0.09	0.89	0.98
114	662,000	83,000	5.5	3.3	8.9	0.47	1.20	0.10	0.79	0.89
115	682,700	57,000	4.8	3.1	7.9	0.40	1.10	0.10	0.66	0.76
117	456,800	56,000	5.7	3.3	9.0	0.45	1.66	0.11	0.99	1.10
404	529,000	44,000	4.4	2.6	7.0	0.47	1.64	0.13	0.81	0.94
405	463,500	66,000	5.1	3.0	8.1	0.50	1.63	0.10	0.93	1.03
407	293,400	50,000	6.0	3.0	9.0	0.48	1.75	0.14	1.04	1.18
408	56,000	56,000	6.1	3.4	9.5	0.48	1.87	0.12	1.11	1.23
Average	3,906,800	62,000	5.3	3.1	8.4	0.45	1.41	0.107	0.85	0.96

TABLE III—A RÉSUMÉ OF ALL MACADAM NOT OVER 1 IN. THICK CONSTRUCTED IN COMPTON DISTRICT DURING 1934

	Thickness, In.	Project Total Sq.Ft.	Daily Rate, Sq.Ft.	Lb. per Sq.Ft.: No. 3 Rock	Lb. per Sq.Ft.: No. 4 Rock	Lb. per Sq.Ft.: Sand	Lb. per Sq.Ft.: Total	Gal. per Sq.Yd.: 90 Oil	Gal. per Sq.Yd.: Emulsions	Cost per Ton: Rock	Cost per Ton: Sand	Cost per Sq.Ft., Cents: Equip.	Cost per Sq.Ft., Cents: Mat'ls.	Cost per Sq.Ft., Cents: Total
Premix	¾	6,466,500	166,000	...	...	...	9.0	...	...	$2.53	...	0.03	1.15	1.23
No. 3 macadam	¾	3,905,800	62,000	5.3	3.1	...	8.4	0.45	...	1.41	...	0.107	0.85	0.96
No. 3 macadam and emulsions	1	1,322,200	46,500	5.3	3.1	0.75	9.15	0.45	0.345	1.41	$1.01	0.15	1.08	1.23
No. 4 macadam	¾	611,600	102,000	...	2.6	...	2.6	0.20	...	1.86	...	0.05	0.35	0.40
No. 4 macadam and emulsions	1	111,600	56,000	...	3.2	1.40	4.6	0.20	0.37	1.73	1.08	0.10	0.71	0.81
Emulsions	...	1,433,800	136,000	...	...	0.80	0.80	....	0.35	....	1.03	0.50	0.27	0.32

TABLE IV—PORTION OF TYPICAL WORK SCHEDULE FOR LOS ANGELES COUNTY ROAD FOREMEN
ROAD DIVISION 113

Street	Limits	Width	Length	Area	Material: Tons Premix	Material: Tons No. 3	Material: Tons No. 4	Material: Gal. 90%	Material: Gal. Emulsion	Estimated Cost: ¢ per Sq. Ft.	Estimated Cost: Total
Paved Way Charge, 9-Lb. Premix											
Alameda St.	Compton Blvd. to Rosecrans	10	2,700	27,000	120						
Beach St.	Firestone Blvd. to 92nd St.	37	2,600	96,000	430						
Cedar St.	Firestone Blvd. to 92nd St.	37	2,600	96,000	430						
Cedar St.	Firestone Blvd. to 92nd St.	37	2,600	96,000	430						
				315,000	1,410					1.33	$4,480
										Cleaning	300
											$4,780
Paved Way Charge, 18-Lb. Premix											
Gave Ave.	Compton Ave. to Alameda	42	3,400	142,800	1,300					2.80	$3,998
										Cleaning	202
											$4,100
No. 3 Macadam—Work Order No. 6567											
Palomar Tract		18	13,200	237,600	710	355	13,100			1.22	$2,900
Randolph St.	(2) P. E. to Wilmington	20	3,300	66,000	200	100	3,650				
58th Place	(2) P. E. to Wilmington	44	1,200	52,800	160	80	2,920				
Junction St.	Randolph to 60th	34	400	13,600	40	20	750				
Alameda St.	Nadeau to Short	20	1,400	28,000	85	40	1,550			1.00	$1,625
				398,000	1,195	600	22,200			Cleaning	175
											$4,700
No. 3 Macadam & Emulsion—Work Order No. 6569											
Stockwell Ave.	Alameda to Wilmington	18	5,000	90,000	270	135	5,000	3,750		1.62	$1,450
Crockett Ave.	Nadeau to 83rd St.	64	1,600	102,400	310	155	5,650	4,250		1.40	1,430
				192,400	580	290	10,650	7,800		Cleaning	120
											$3,000

nished a fair waterproofing for any reasonably stable subgrade. There are 410 miles of this topping in use, and it shows a surprising length of life and low maintenance cost when placed with proper traffic and grade considerations. The cost of one mile, 20 ft. wide, is about $425, partial details of which are shown in Table III.

It is recommended as a cheap means of proving a subgrade, to subject this sealing to traffic for several years prior to constructing a heavier surface. Any failures of grade can thus be corrected, and at the same time the public is furnished an all-weather road.

Macadams sealed with emulsions

Both No. 3 and No. 4 macadams are frequently sealed at the time of construction by an application of ⅜ gal. per square yard of emulsified road oil, penetrating the last layer of 3 lb. of No. 4 rock per square foot. The emulsion is lightly spattered with about ¼ lb. of sand per square foot, and opened to traffic without rolling subsequent to sanding. Fig. 3 shows a 2-in. macadam, one side of which was sealed with emulsion and the loose screenings permitted to whip off the unsealed half. A texture chart shows a very decided improvement due to the application of the seal coat. We are experimenting, using 90 oil for this seal coat.

A compilation of numerous measurements of thickness of both sealed and unsealed No. 3 macadams shows that the application of emulsions adds ¼ in., or increases by one-third the thickness of the unsealed macadam. Table III shows about 1,500,000 sq. ft. sealed at a cost of 0.32c. per square foot for the sealing alone. As the average unsealed No. 3 macadam cost was 0.96 c. per square foot, this is an increase in cost of one-third. An emulsion seal, therefore, while increasing the cost one-third, also increases the thickness one-third. A number of test holes in these light surfaces revealed the fact that the emulsion-sealed road was of a distinctly higher type than the unsealed. The slight difference in riding qualities, as compared to the premix, could probably be eliminated by a heavier sanding, but such an expenditure is not warranted in a surface so thin and with so little possible to gain in smoothness. Emulsions do not seem to bleed, thus eliminating labor and material during the hot months. The low viscosity of this material gives a waterproofing impossible to obtain with hot oil. We recommend that all macadams, irrespective of their thickness, be sealed with emulsions.

Comparison of surfaces

For smoothness, premix ranks first, sealed macadam a close second, and unsealed macadam third. For cost, unsealed is the cheapest, with premix and sealed macadam higher but equal to each other. For subgrade considerations, premix requires a better foundation than macadam—that is to say, the macadam will undergo more distortion before failure. For maintenance cost, premix and sealed macadam are about equal and very decidedly cheaper than the unsealed surface. For life of service, our ¾-in. premix is only four years old and no failures have yet occurred, our sealed macadams are three years old and they too have shown no failures. Prior to this time unsealed surfaces were universal, and their life, when constructed on a proper subgrade, could perhaps be estimated at around six years. Stability of subgrade is usually the determining

factor in the selection of these wearing surfaces.

No. 4 macadam is often used in newly formed subdivisions, where neither traffic nor development warrant a thicker type. It can be used where, due to a large unimproved mileage, sealing must be spread over a great area. Where progressive construction is in vogue, this surface is admirably adapted to the first step. The percentage of cost to material and laying is as follows:

	Premix %	No. 3 Mac. %	No. 4 Mac. %
Material	93.5	88.8	87.0
Labor, machinery, etc.	6.5	11.2	13.0
	100.0	100.0	100.0

Patching methods and equipment

There are two main methods of patching: one is filling depressions with a previously prepared plant mix, and the other is using some form of asphalt, hot oil or emulsion, combined with various sizes of rock as needed in the field. This department endeavors to have all patches ride as smoothly as the original pavement, and not infrequently they ride smoother. If the smoothness of patch is a fundamental principle, the plant-mix method can not logically be used unless a tack coat is available to feather out the edges, nor will such a mix readily serve the purpose of depressions under ½ or ⅜ in. in depth without a tack coat. The patch crews use both 90 oil and emulsions. The amount of hot 90 oil used per ton or rock in patching, as near as we are able to ascertain, is 14½ gal.

From Table II it is noted that 0.45 gal. of 90 oil per square foot is used in construction, and this corresponds to 10½ gal. per ton of rock. As such a relation between oil and rock is stable, we are using about 40 per cent excess hot oil in patching. This excess is due to the impossibility of accurately gaging hand oiling as compared to machine oiling, and to years of habit together with many other factors such as nozzle design, wrong pressure, etc. We think the elimination of all excess oil is impossible but feel that it can be reduced appreciably by periodically bringing to the attention of the crew the relation of gallons of oil per ton of rock. Our records show that per ton of rock used in patching more gallons of emulsion have been used than hot oil. However, this has recently been reduced about 20 per cent by the use of air at the spray nozzle. While we do not have at this time accurate data on this subject we believe that little if any more emulsion is required in patching than hot oil, provided air is utilized.

Our average patch crew, whether using hot oil or emulsions, is composed of one truck and driver, one foreman, four men and a five-ton roller with its operator. Such a crew, including machinery rentals, costs approximately $48. It will average 16 tons of rock daily. Materials, rock and oil total $34. This makes a cost of approximately $5 per ton of patch laid. The cost of a plant mix, for materials alone, delivered to a central field point, is $2.53, and to equal the above patch cost requires 3½ tons to be laid per laborer per day. Assuming that the majority of holes are not over 1 in. in depth and that smoothness of patch is demanded (both of these conditions pertaining to our highway system), we have not been able to lay that daily tonnage of plant mix per man-shift.

For patching purposes this department mounts an oil tank (Fig. 4) directly back of the truck cab. The tanks hold from 325 to 450 gal., leaving about 7 tons of rock capacity available. If hot oil is used, the tank and the circulating lines to the rear of the bed are insulated to prevent loss of heat. The motor exhaust is so arranged that it can be passed through the oil storage, around the circulating lines or wasted. A detailed account of our first unit, truck 96, utilizing the heat of exhaust motor gases, was given in *Engineering News-Record*, Sept. 29, 1932. About one year ago we built our second unit, truck 185, and made what alterations seemed warranted; the second unit is capable of utilizing more of the exhaust heat than the first one. The full tank of oil was raised from 400 deg. to 407 deg. while the truck was traveling from warehouse to rock stockpile, and at night the unexpended oil, some 105 gal. was raised from 375 to 390 deg. during the return trip. The exhaust when the crew is patching (the motor is at idling speed) is passed through the circulating discharge line. Gases are passed through the tank only when the truck is traveling. Although the tank is well insulated, the tests show that oil would have been 320 deg. F. if no exhaust heat had been used. This maintenance unit has modernized hot-oil patching, made obsolete the old hand-operated oil pot and trailer, and thereby reduced the force necessary to handle a given tonnage.

If emulsion is used, tank and lines are not insulated. The hot-oil pumps and their driving mechanism are not needed. A 6-cu. ft. compressor, separate from that of the brakes and driven from the motor transmission, furnishes the air

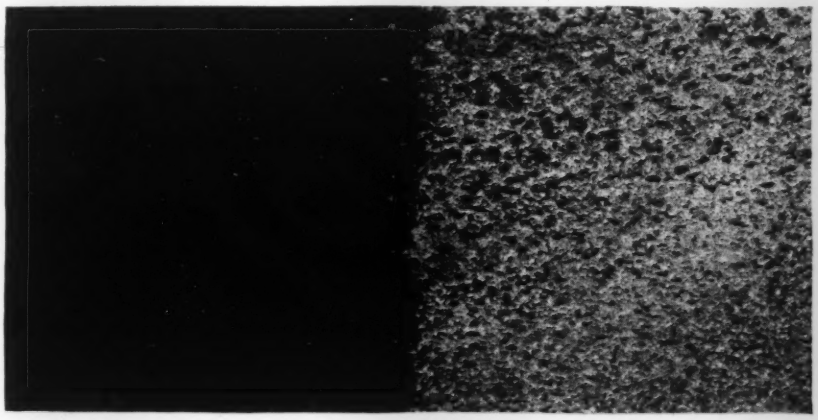


FIG. 3—EFFECT OF EMULSION SEAL in holding loose screenings on surface of macadam; screenings on unsealed half are whipped off by traffic.

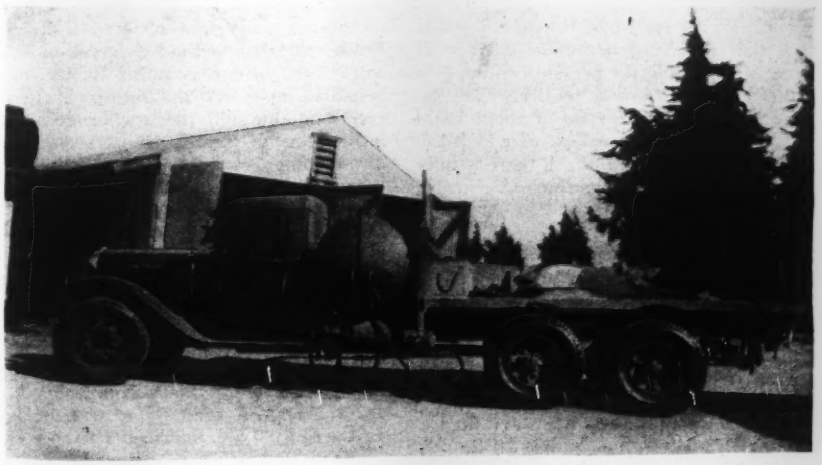


FIG. 4—PATCHING TRUCK with emulsion tank for 325-450 gal. and body for about 7 tons of aggregate.

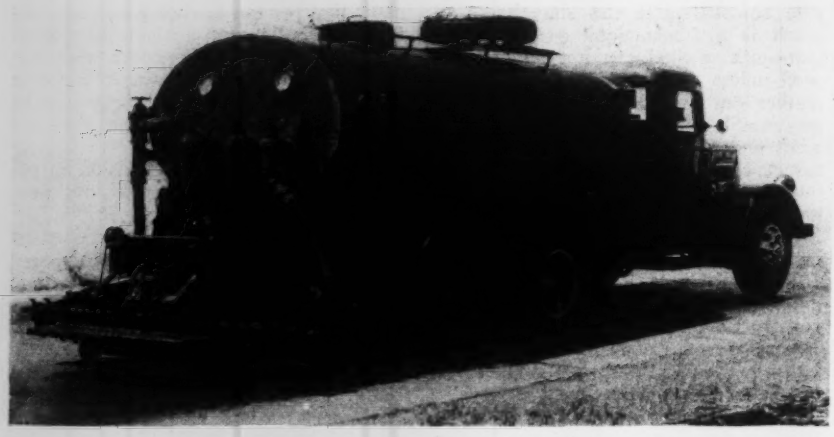


FIG. 5—OIL-SPREADING TRUCK with two pumps and two headers for applying either hot or cold oil.

necessary to spray the emulsion. This unit is more simple in design, and its initial cost less than that of the hot oil.

Cold and hot-oil pressure distributor

We find that to secure capacity performance from our oil-spreading trucks (Fig. 5) it is necessary to be able to spread with the same machine either hot 90 oil (over 400 deg. F) or emulsions or other light oils. If a truck, returning from spreading a load of cold oil, is filled with hot oil, it will boil over. Therefore it is necessary to "wash out" by circulating 30 or 40 gal. of, say, 60 per cent asphaltic oil through the system, thus removing all water from the pump and circulating lines. This requires about 30 min. To prevent this loss of time and to secure the other advantages enumerated below, we built a distributor with two pumps and two header bars. The customary hot-oil pump is, of course, within the insulated tank and functions as usual. In addition, a second or cold-oil pump is placed between cab and tank and has its own separate circulating lines and header. The two pumps operate from a common sump with valves between each pump and the sump. With this arrangement no light oil can enter the hot-oil pump and circulating system, nor can hot oil enter the light-oil system. The advantages of the two-pump, two-header design are:

1. Each pump is more efficient with an oil of a given viscosity than when an attempt is made to handle the entire range of viscosities with a single pump.

2. It is highly desirable to install a screen on the suction of the hot-oil pump in order to prevent clogging of the nozzles of the header. This is not feasible if emulsions are drawn through the same suction, due to the breakdown tendency of the screen on the emulsions.

3. It is easier to maintain pump packings where violent changes of temperature are not resorted to, as where a pump alternately handles hot and cold oil.

4. No light oils go through the hot-oil lines and header, and thus the tendency to boil, if not eliminated entirely, is reduced to a minimum.

5. Emulsions do not work so well with the three-way valves so desirable in hot-oil work. By the use of two headers the three-way valves are retained for the hot oil, while more suitable valves are installed for the emulsions.

Although this distributor has been in operation only four months, we believe the above five reasons upon which the design was predicted are being proved to be correct. In our next unit of this type we shall investigate the practicability of utilizing the exhaust-engine heat to prevent freezing of the nozzles, the only mechanical source of delay not eliminated by our present design.

Personnel

All work was done under the supervision of George W. Jones, road commissioner, and Orrin F. Cooley, assistant road commissioner. Acknowledgement is made for valuable aid rendered to C. E. Weary, maintenance engineer. Further acknowledgement is also made to N. H. Templin, assistant district engineer, to H. D. Vreeland, warehouse foreman, and to our premix, paved-way and district foreman, whose cooperation and willingness to modernize have made possible the contents of this article.

Long-Span Bridge Development as Seen by a British Engineer

THE PROPER FIELD for long-span steel bridges, factors in the selection of the proper structure for a given location, and the probable and necessary trends in materials improvement and design technique were outlined in a significant paper delivered before the International Congress for Steel Development in London last June by Ralph Freeman, consulting engineer on the 1,650-ft. Sydney Harbor arch and designer of the 1,100-ft. arch now under construction over the Sabi River in Rhodesia. At the start Mr. Freeman pointed out that the construction of bridges of long span during the present century has been confined almost entirely to the United States. If a span of about 1,000 ft. is taken as the smallest to which the term "long" can be applied, there is only one long bridge in Continental Europe, one in Great Britain, one in Australia and two in Canada.

Looking to the future, it is Mr. Freeman's belief that long-span bridges will be confined to highway and light passenger railway service. Long-span bridges are usually over navigable waterways and thus at high level, requiring expensive approaches if standard railway traffic is to be served. Also, most of the needs for long-span railway bridges have already been satisfied.

Mr. Freeman stressed the importance of foundation conditions in selecting the type of bridge for a given crossing. Of the three principal types, the cantilever produces vertical reactions only on its supports; the arch imposes a thrust upon its supports, while the suspension type requires anchorage at its supports. Analyses of superstructures, apart from their supports, only deal with half the problem of design. In many cases the character of the foundation site alone may be a determining factor, thus eliminating the necessity for studying alternative superstructure designs.

Another important aspect of design is the intended method of erection. A suspension bridge contains in its own principal members the means of their erection, although the anchorage must have been previously constructed. A disadvantage of a suspension bridge is that the shore ends of the cables often represent waste material. In a cantilever bridge, on the other hand, the anchor arms are useful parts of the permanent structure, provided the bridge is erected as a balanced cantilever. However, if the anchor arms must be built on temporary falsework, they are practically waste material since they serve only to provide a counterbalance for the central span. An arch bridge is the only type that contains no extraneous supporting material, corresponding to the shore spans of the cantilever and suspension types. On the

other hand, the arch is the most difficult type to erect and requires the largest amount of temporary material.

Improvements in Steel—In the early part of this century it was customary to build steel bridge spans of mild steel having a yield stress of about 15 tons per sq.in. and sustaining a working stress of 7.5 tons per sq.in. The silicon steel used for many American bridges and for the Sydney Harbor Bridge is about one-third stronger than mild steel; and steel now being made in Germany and in Great Britain, with a small percentage of chromium, has a yield stress of about 23 tons per sq.in. and will sustain a safe working stress about 50 per cent higher than mild steel. Nickel steel with a yield stress of 22.3 tons per sq.in. has been used in exceptional cases, but its high cost has precluded its general utilization. This improvement of steel quality increases the length of span that is practicable in arch or cantilever designs, and on a favorable site such structures would be cheaper than a suspension bridge for spans up to 1,500 ft., in Mr. Freeman's opinion. Furthermore, it is possible that both better steel and lower-cost steel will be produced.

The effect on the weight of a large bridge, using steels of these kinds, was illustrated by some weights calculated for Sydney Harbor, assuming a working stress one-half the yield stress and disregarding the consequential effect of reduced size of members on wind and temperature stresses. The comparative weights of the trusses were given as follows: mild steel, 33,000 tons; silicon steel, 23,000 tons; structural chrome-steel, 19,000 tons.

Mr. Freeman pointed out how the relationship of the working stress to the yield stress has an effect similar to improvements in steel quality. For many years on mild steel structures it was taken as one-half the yield stress, or 7½ tons per sq.in. Practical experience has led to an increase to 9 tons per sq.in., or 60 per cent of the yield stress.

Live Loads—Loads specified by British regulations (on areas 75 ft. long and 40 ft. wide) are equal to sixteen trucks weighing 15 tons and four weighing 27 tons, the average length being 15 ft. According to Mr. Freeman, roadway vehicles of this weight and length do not in fact exist at all, let alone in such numbers as to permit 20 of them to find their way into one group, producing the maximum stress in a particular part of a bridge. Mr. Freeman stated that he had never been able to find an actual maximum loading greater than 90 lb. per sq.ft. on a 75x40-ft. area. British regulations require a design load of 292 lb. per sq.ft., and American regulations 200 lb. per sq.ft.

"I am convinced," said Mr. Freeman, "that proper study of actual road traffic would lead to a substantial reduction of the loading defined by present-day regulations It would be good policy to impose a limitation on the axle loads of vehicles allowed to use a costly bridge rather than to construct the bridge of excessive strength in order to carry a loading that would scarcely ever use it." The design of the deck itself provides considerable scope for economy, and it may be cheapest to adopt specialized and apparently expensive types of construction in order to make a saving of greater importance in the principal trusses. As an example, it was noted that in a bridge of the Sydney Harbor type (1,650-ft.-span, steel arch) each ton of extra material distributed on or in the deck required 6 tons of steel in the trusses to carry it to the foundation.

Fields for Research — Knowledge of bridge design, said Mr. Freeman, could be advanced more rapidly by experiment on large-scale models. Experiments in the past have been made principally on models of members.

Information is also needed on the strength and economical construction of joints. Butt joints are usually designed in compression members with sufficient rivets and covers to sustain the whole stress, whereas further experimental evidence might show that this is not necessary. In the Sydney Harbor Bridge, the butt joints in compression members were very accurately made, and if they had been relied upon to take the stress, a saving in weight of 5,500 tons could have been made.

High-strength steel has produced new problems, for, to make the most effective use of it, it is necessary to use material of smaller thickness than practice has accepted as suitable for mild steel; no experimental data exist on which to base such designs. High-strength steel also requires rivets of greater strength, and here also further experiment is required.

Measurements of stresses in existing structures, such as those made on the Hell Gate arch, are very rare. This is particularly unfortunate, and more studies of this nature are needed.

Finally, although wind pressure accounts for a considerable part of the weight of trusses, especially in long-arch or cantilever bridges, little definite information is available on the subject, and data are being accumulated very slowly.

Welding—The use of welding for the construction of members and field joints of bridge structures, in Mr. Freeman's opinion, opens up great possibilities of economy, especially in connection with long spans because the consequential effect of saving weight would justify a higher cost of construction.

Notes on Bridge Types—Nearly all large suspension bridges have followed the precedent set by the Brooklyn Bridge is using parallel wire cables, with wires of about 0.2-sq.in. cross-section. Although the diameter of wire used has remained almost constant, the quality of wire has steadily improved, as shown by the following tabulation giving the ultimate strength of wires used in representive bridges:

Bridge	Tons Per Sq.In.
Brooklyn	80
Williamsburg	90
Manhattan	96
Delaware	100
George Washington	104
Golden Gate	104

On the same bridges the stiffening trusses have gradually been reduced in depth and weight. An indication of the respective strength is given by the depth of the following trusses:

Williamsburg	1/40 span
Manhattan	1/60 span
Delaware	1/62 span
George Washington (present) no stiffening truss.	
George Washington (with 2 decks)	1/120 span
Golden Gate	1/168 span

In the design of cantilever bridges one of the principal problems is the choice of length of suspended span. The economic length is easy to calculate if the weight of metal in the permanent structure only is considered, but this represents only part of the cost. Erection is equally important, and when erection costs are considered a reduction in the length of the suspended span is likely to be justified. The form of structure of a future cantilever bridge is not likely to differ materially from that of the Quebec Bridge.

The longest-arch span for heavy traffic is the Sydney Harbor Bridge of 1,650-ft. span. This was built of silicon steel. The use of chrome-alloy steel would enable a span of considerably greater length to be built and, if the site conditions were favorable, the span might be as long as 2,500 ft. and cost less than that of a cantilever bridge of the same length, said Mr. Freeman.

Large Pumps in English Drainage Works

It was stated in an article published in our issue of Sept. 27, p. 399, that the pumps of the Middle Level Drainage and Navigation District in England are believed to be the largest centrifugal pumps ever built. This statement needs to be qualified, as it is true only in so far as horizontal pumps are concerned. There are somewhat larger-capacity pumps on the Zuyder Zee drainage works in Holland. At the Lely pumping station of these works there are three vertical-shaft centrifugal pumps with 99-in. runners, each directly connected to a motor on the head of the shaft. They run at 107 r.p.m., with a mean head of 18 ft., and each has a capacity of 87,000 g.p.m. (Imperial). At the Leemans pumping station on the same works there are two 69-in. horizontal-shaft pumps running at 133 r.p.m., with a mean head of 16 ft. and having each a capacity of 55,000 g.p.m. (Imperial). These pumps are driven by oil engines.

Rigid-Frame Concrete Bridge in Pueblo Style Architecture

By Wm. E. Strohm
Structural Designer,
New Mexico State Highway Department,
Santa Fe, N. M.

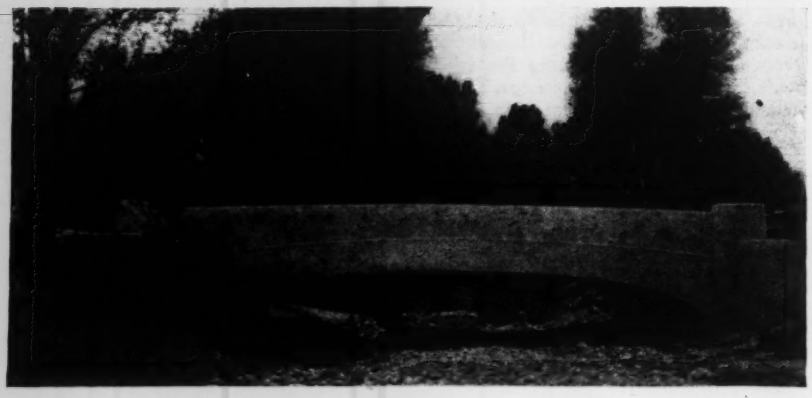
THE NEW Don Gaspar Street bridge over the Santa Fe River in Santa Fe, N. M., is notable both as the first rigid-frame bridge to be built by the state highway department and as an example of the "Santa Fe style" architecture, embodying a Pueblo Indian motif, which is being fostered for all new buildings in the city. Dedicated recently as the "Puente de los Conquistadores Bridge," the new concrete structure is of filled spandrel type of barrel design, with a clear span of 50 ft. A total width of 59 ft. 10 in. provides for a 41½-ft. roadway and two 7-ft. sidewalks. The frame is 18 in. deep at the crown and 48 in. at the haunches. Footings were carried down 14½ ft. below the springline into hard foundation material of cemented conglomerate. The intrados is an elliptical curve of 5½-ft. rise, the extrados is a circular curve, and the tops of the railings and the offset at the junction of the railing and the spandrel wall at the outside face are parabolas.

The frame is designed for an H-15 loading. Due to the depth of fill between the roadway pavement and the top of the frame, no impact allowance was made. Design stresses for the concrete and the steel were 650 and 16,000 lb. per sq.in. respectively, while the footing design pressure was 5,000 lb. per sq.ft., a conservative value for the foundation material. The stress analysis was made on the basis of the vertical legs being unrestrained at the tops of the footings; therefore, an asphalt painted construction joint was provided between the frame and the footings, to insure against bending moments being developed along this section.

The footings of the retaining walls adjoining the frame are 3½ ft. above the bottom of the frame footings. In order to avoid pouring the retaining-wall footings on backfilled material placed around the vertical legs of the frame, a short length of retaining wall adjacent to the frame was constructed as a horizontal cantilever supported by the main retaining wall. Premolded asphalt joints are provided where the retaining walls abut the vertical legs of the frame, to allow the frame and walls to deflect independently.

Designs for the bridge were prepared in the office of G. D. Macy, state highway engineer, under the direction of E. B. Van de Greyn, bridge engineer. Plans were reviewed in the office of J. A. Elliott, district engineer for the Bureau of Public Roads, at Denver. Trent Thomas, of Santa Fe, worked out the architectural treatment. The contractor was F. D. Shufflebarger, of Albuquerque; Harry Miner handled the construction, and Roy Robertson was project engineer.

RIGID-FRAME CONCRETE BRIDGE recently completed in Santa Fe, N. M.



Japan Completes Long Tunnel After 16 Years of Difficulties

OPENING OF TRAFFIC through the 5-mile Tanna Tunnel of the Japanese Government Railways, now scheduled for Dec. 1, will mark the completion of this difficult and dangerous project that was started in July, 1918, sixteen years ago, but which met with an unprecedented combination of difficulties.

A review of the work (*ENR*, Feb. 27, 1930) outlined the extraordinary conditions encountered in tunneling a volcanic range. Geologic faults, swelling and shattered ground, mud slides and enormous quantities of water under high pressure were some of the difficulties that were met. Two serious earthquakes also occurred during construction.

Work was begun in July, 1918, with a bottom heading from each end. A drainage tunnel, beneath and parallel with the main heading, had to be driven nearly the entire length in order to divert the water from headings temporarily abandoned or bulkheaded on account of the heavy flow. In other places, concrete bulkheads were built when faults were encountered, drain holes being drilled later through the bulkhead and radial holes drilled for the grouting of the unstable material. At faults and mud slides the headings were sometimes bulkheaded and abandoned temporarily while bypass drifts were driven around the dangerous spots to reach the tunnel line in good ground beyond, when headings were started both forward and backward. Compressed-air shields and steel timbering had to be installed at some points. About 70 men have been killed, some drowned, and others buried in mud slides in the headings.

In July, 1929, after eleven years' work, only 75 per cent of the tunnel had been completed. Since the spring of 1933, however, good progress has been made, without any serious difficulties. The last drainage tunnel or drift was completed on June 19, 1933, and the bottom headings met on Aug. 25. Lining was completed March 10, 1934, and tracklaying in September. Trial runs and inspections are to be made during October and November, preparatory for the official opening on Dec. 1.

The Tanna Tunnel is the principal feature of a 30-mile cutoff on the Tokaido main line, between Kozu and Numazu, with maximum grades of 1 per cent, superseding the original 37-mile line that crossed the range by grades of 2½ per cent and reached a summit elevation of 1,499 ft., as compared with 259 ft. on the new line. The tunnel is of horseshoe section, 28 ft. wide at the springing line and 22½ ft. high from subgrade to crown, the arch having a radius of 14 ft. Concrete lining is from 30 to 75 in. thick, generally with poured concrete for the walls and precast concrete blocks for the arch.

Letters to the Editor

Side Pressure on Retaining Walls

Sir—The purpose of my previous letter on the same subject (*ENR*, April 19, 1934, p. 514) was not to draw practical conclusions from Professor Terzaghi's test results but to call attention to the friction along the bottom of the bin—a factor generally overlooked by soil-pressure investigators—as the probable cause of the high position of the side-pressure resultant. By a too literal interpretation of Coulomb's theory, this important factor is lost sight of, whereas its significance is revealed when we consider the wedge action of the individual grains and the elastic yielding of the soil.

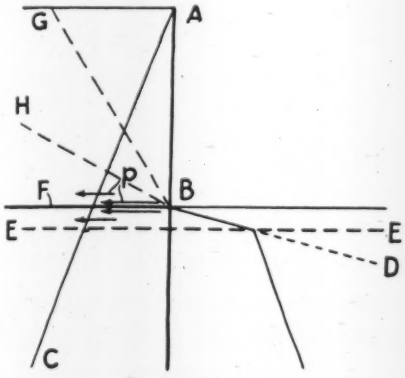


Fig. 1

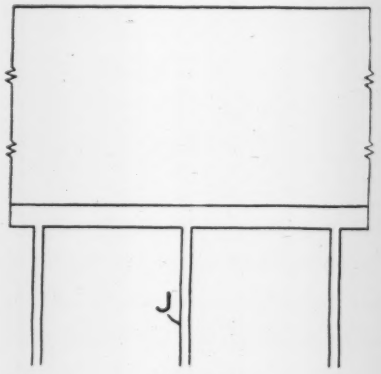


Fig. 2

In his answer (*ENR*, July 12, 1934, p. 55) Professor Terzaghi avails himself of a hypothetical case to support his contention that arching in the sand is responsible for the falling off of the side pressure near the foot of the wall. The arguments advanced, however, are not convincing.

In the first place, with the pressure on the left side larger than on the right, the diaphragm could not remain in static equilibrium; a movement toward the right must take place *before* the lower part of the diaphragm is destroyed, thus mobilizing the passive pressure until a state as shown in Fig. 1 is attained.

The active pressure on the left side is represented by the line *A-C*. The passive pressure on the right side, increasing with depth at a much faster rate, is indicated by the line *B-D*; at plane *E-E* it attains the same intensity as the active pressure on the left side; below this plane the pressures on both sides keep on increasing at the same rate.

The upper part of the diaphragm, being rigidly supported by the lower part, will retain its vertical position in spite of the inequality of the pressures above plane *E-E*, the pressures being alike at all points below. If we would destroy the lower part in its entirety, the upper part would topple, so in order not to complicate matters by the introduction of bracing we will assume that narrow vertical strips *J* (Fig. 2) of the diaphragm below plane *E-E* are left intact while the portions between them are destroyed.

Through such elimination of the diaphragm the pressure distribution described above is in no way changed, and no heaving will take place. If, however, the destruction were to be carried above plane *E-E*, say to point *B*, the sand would be subjected to unbalanced pressure and start flowing. But such a condition is usually guarded against, being liable to cause settlement in adjacent structures.

Following the author's line of thought a little further, let us assume that before the surface is touched a perfectly rigid horizontal diaphragm *F* is also established, extending an infinite distance to the left of point *B* but having no physical connection with the vertical diaphragm.

As the excavation proceeds and the vertical diaphragm and adjacent soil are moving toward the right, as already explained, the horizontal diaphragm is prevented by its friction against the embedding soil beyond from partaking in the movement. Through friction it also exerts a restraint on the moving soil, counter-pressures *p* being set up which reduce the active side pressure in the vicinity of point *B*.

In the author's tests the bottom of the bin takes the place of the horizontal diaphragm, and there would thus seem to be no need of resorting to arch action in order to explain the results obtained, which may be sufficiently accounted for by the friction along the bottom slab.

If the side pressure, in accordance with Coulomb's hypothesis, were due to the sliding tendency of the soil prism *ABG*, it should remain unaffected by conditions existing below the plane of repose *B-H*. The above considerations show, however, that this is not the case. The hypothesis is not, like Rankine's, founded on theoretical reasoning; being in fair agreement with observed facts, it may properly be regarded as a happy geometrical coincidence.

Professor Terzaghi's statement that few tunnels are built to resist a pressure of such intensity as the Rankine pressure is not borne out by standard American practice as embodied in the specifications of the Board of Transportation and its predecessors, under whose direction more than 120 miles of subways and tunnels have been built within New York City limits. Not only are these structures built to resist the Rankine pressure, but the usual margin of safety has been provided besides, keeping allowable stresses well below the yield point of the material used.

ANDERS BULL,
Assistant Engineer,
Board of Transportation.
New York, N. Y.,
Aug. 17, 1934.

Fines in Concrete

Sir—The article by Professor Lyse on the "Effect of Fine Clay in Concrete" (*ENR*, Aug. 23, 1934, p. 233) is of considerable value because it helps to clear up a point which for many years has been debatable. Many will perhaps recall the discussions around 1910 of the effect of loam in concrete. At that time loam, in the minds of some, became confused with clay. Ultimately this matter was cleared up by Harder's work on the effect of organic matter, which resulted in the well-known color test and a distinction between loam (organic containing material) and clay.

In practice, the question of whether to wash a sand often presents itself. Many a good sand has been left unimproved by washing and, in fact, impaired as to quality. In general, clay has come to mean the very fine material often associated with sand or gravel, though in reality this fine material is often not clay. However, real clay in concrete may, under certain circumstances, be detrimental as regards strength. Whether it be so or not depends on its relation to the other aggregate particles; if it is in the loose state, no detrimental effect would be expected, whereas if it adheres more or less firmly to those particles, one should expect trouble.

An example of this occurred on the Ghost River power project (Southern Alberta). The aggregate contained 2.1 per cent by weight of fine rock flour of glacial origin. To have washed this material out would have impaired the excellent quality of this sand. The bed of gravel from which the material was obtained was about 12 ft. thick and overlaid a bed of clay. In spite of warnings, on one occasion the steam-shovel operator got down into the clay stratum. The effect of this was immediately re-

flected by a marked decrease in strength of the concrete, yet this material had been separated on a vibrating screen that would remove almost anything except a wet clay.

Again, in this city, there is a central mixing plant which has for several years turned out high-grade concrete. The aggregate is a washed sand and gravel from about 50 miles west. A quantity of concrete was delivered a few years ago to a fair-sized job, and the strength tests at 28 days showed only about half what they should have, judged by many previous tests with the same aggregates. An investigation revealed immediately that several carloads of unwashed material had been delivered to the bins. The aggregate particles were thinly coated with clay.

Other examples could be cited regarding this effect of clay on the strength. The lesson is clear enough, and the remedy is either washing or prolonged mixing, preferably washing, to remove clay that adheres to the grains. Otherwise, fine material often mistaken for clay and clay in a finely divided state should be retained.

I. F. MORRISON,
Professor of Applied Mechanics,
University of Alberta.
Edmonton, Alberta, Canada,
Sept. 12, 1934.

Remember the Tourist!

Sir—The highways are lined with oddities which Ripley, the Believe-It-Or-Not Man, misses. For instance: The exterior of bridges—i.e. the sides seldom seen by anybody—are often works of art, resplendent with beauty of line and material, while the inside, which the tourist does see, is frequently left drab and uninteresting, while effectively blanking off with hand-rails the view of the scenery beyond the parapet.

It is just as if engineers and architects designed their bridges with the special object of making beautiful broadside pictures to hang on their office walls or to publish in magazines. The result is that the tourist gets as much beauty traversing a tunnel as passing over some of our million-dollar bridges.

As to constructive criticism of such a practice:

First, curbs, walks and hand-rails should be constructed to standards exceeding those set for the rest of the structure.

Second, hand-rails should be low enough (if built of concrete or stone) to permit the tourist to see the stream in the distance. Preferably, the hand-rail should be open. Quite often a combination of steel hand-rail built in panels between concrete posts, resting directly on the walk or on a low parapet, will answer all requirements of strength, while allowing the eye to rove through the pickets to nature's paintings beyond.

G. D. HOUTMAN,
Bridge Engineer.
Media, Pa.
Sept. 15, 1934.

Book Reviews and Notes

A monthly Commentary on Current Additions to the Civil Engineer's Library

Dynamics of Earth

DYNAMICS OF EARTH AND OTHER MACROSCOPIC MATTER—By John H. Griffith. Paper 6x9 in.; 152 pp. Bulletin 117 of Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa.

THE AUTHOR'S STATED PURPOSE is to formulate the dynamical laws pertaining to disperse systems as they relate to engineering. An epitome of the dynamical laws is given in the first three sections; the remaining sections are devoted to engineering applications and supplementary problems. These applications cover lateral earth pressure, retaining walls, tunnel conduits and other inclusions, discussion of the work and formulas of early "earth" scientists, piles and foundations, railroad embankments, hardness of matter, theory of plasticity, degradation of energy and equilibria of heterogeneous matters.

Water Power Textbook

WATER POWER ENGINEERING—By H. K. Barrows. Second Edition. Cloth; 6x9 in.; pp. 762; photographs, diagrams and tables. Published by McGraw-Hill Book Co., Inc., New York. $6.

WRITTEN ORIGINALLY in 1926 to fill the need for a textbook for the course in water power engineering at Massachusetts Institute of Technology, this second edition of Professor Barrows' book has been made necessary by developments in the art of water power generation as well as by changes in the economic relation between water power and steam power when employed for the production of electricity. As a result, the chapter on the cost and value of water power has been rewritten and other chapters have been revised and expanded to cover such subjects as the introduction of the Kaplan adjustable-blade propellor-type turbine. In all, about 30 pages of text have been added.

Economic Power Questions

POWER SUPPLY ECONOMICS—By Joel D. Justin and William G. Mervine. Cloth; 6x9 in.; pp. 276; diagrams and tables. Published by John Wiley & Sons, Inc., New York. $3.50.

JUST AS ECONOMIC CHANGES have made a revision of Professor Barrows' book on water power desirable, so have they made desirable a still broader discussion of the whole subject of the economics of power supply as it is given in this new book by Joel D. Justin and William G. Mervine. The technical side of power development is touched upon in this book only to the extent necessary to clarify the discussion of economic questions. The subjects discussed are the development and use of power, load predictions and planned capital expenditures, fuel for steam power production, steam power plants, internal economics of steam power plants, cost of steam-electric power, general factors controlling the economic utilization of water power, internal economics and the economic functions of hydro-electric plants, cost and value of hydro-electric power, peak-load plants, interconnection as an element of power cost, oil-engine plants and industrial power plants.

Early History of Hetch Hetchy

HETCH HETCHY—By M. M. O'Shaughnessy. Cloth; 9x12 in.; pp. 133; line cuts and halftones. For sale Newbegin's Book Shop, San Francisco, Calif. $5.

A PERSONAL NARRATIVE of the origin and history of San Francisco's new water-supply system is told by the "builder of Hetch Hetchy." The emphasis is distinctly on the origin and the early controversial stages that featured the initiating of the project. With his appointment as city engineer in 1912, Mr. O'Shaughnessy describes in minute detail his first inspection trip over the Hetch Hetchy valley and pictures its physical condition. There follow copies of official correspondence and interesting opinions covering the prolonged fight of San Francisco to secure permission of the federal government to use the reservoir site in Yosemite National Park and the long history of the city's efforts to purchase the private water-supply system. Statistics on the power-production economics and the bond issues for Hetch Hetchy financing are given in some detail. The later phases of the project, including the extensive tunneling operations and the pipe-line work, are only touched upon. As a personal review of the early stages of this important water-supply undertaking the book is of historic value.

A Treatise on Highways

HIGHWAY DESIGN AND CONSTRUCTION—By Arthur G. Bruce. Fabricoid; 6x9 in.; pp. 628; photographs, diagrams and tables. Published by International Textbook Company, Scranton, Pa. $4.

WITH ITS 600 PAGES of compact type and 232 illustrations, this new text on highway design and construction takes on the character of a treatise rather than a manual or textbook. The wise plan adopted by the author of submitting his manuscript to a practical teacher for careful editing with the needs of the college student in mind, however, has added textbook value to a volume naturally

produced for the practicing engineer by a practicing engineer. In 28 chapters the author takes the reader through highway location, type design, construction of each type, guard-rails and markers, lighting, roadside improvement, sidewalks, cleaning and snow removal, and the construction of airport landing fields. It is in treatment rather than in scope that the text deserves commendation. In general, this text is remarkably close to the latest developments in design and construction, and in particular it is exceptional in the extent and quality of its presentation of the latest knowledge of soil surveys, classification and stabilization. On these subjects the 50-page chapter on soil studies is by all odds the best discussion available apart from the original research reports.

Consumptive Capacity Exceeds Output

AMERICA'S CAPACITY TO CONSUME—By Maurice Levens, Harold G. Moulton and Clark Warburton. Cloth; 6x9 in.; pp. 272; diagrams and tables. Published by The Brookings Institution, Washington, D. C. Price $3.

AMERICA'S potential capacity to consume far exceeds its capacity to produce, according to the authors of this second of four books on the relation of the distribution of national wealth and income to economic problems. The first book of the series (*ENR*, July 26, 1934, p. 118) discussed America's capacity to produce. The volumes yet to come will be devoted to the formation of capital and to income and economic progress.

The studies analyzed in the present book are summarized in six statements: "(1) During the so-called new era of the gay twenties the United States was not living beyond its means; (2) there has been a tendency, at least during the last decade or so, for the inequality in the distribution of income to be accentuated; (3) vast potential demands alike for basic commodities and for conventional necessities exist in the unfilled wants of the masses of the people, both rural and urban; (4) the United States has not reached a stage of economic development in which it is possible to produce more than the American people as a whole would like to consume; (5) we cannot materially shorten the working day and still produce the quantity of goods and services which the American people aspire to consume; (6) in emphasizing the need of increasing consumption, we must not forget the necessity of simultaneously expanding production."

The findings of the two books are briefly summarized in the following statements, included under the authors' comments on statement 4 above:

Actual goods and services produced in 1929 had a value of about 81 billions of dollars.

The *potential* production (with existing methods) equaled about 20 per cent more than actual production, or 97 billions.

Actual production of *consumption* goods in 1929 equaled approximately 70 billions, and *potential* production of *consumption* goods equaled about 86 billions.

Raising all family incomes below $2,500 to $2,500, with no change above that level, would increase actual consumption by more than 60 billions.

Adding $1,000 to every family income below $10,000 would increase consumption by about 27 billions.

In discussing the short work week, the authors state that the actual production of 1929 was accomplished on an industrial work week that averaged close to 51 hours. "If we were to shorten the working week to 30 hours, as has frequently been suggested, with a view to absorbing all complete and partial unemployment, the production would be greatly reduced. Unless we can be sure of a vast increase in productive efficiency, the working day cannot be appreciably shortened without a curtailment of production and, consequently, without reducing consumption standards below the level of 1929. Whether we live under a wage, price, and profit system or under a completely communistic method of economic organization, it will always be true that the level of consumption or the standard of living can be raised only through the production of food, clothing, shelter, comforts, and luxuries."

Miscellaneous Notes on Booklets and Reprints

VIBRATION AS A METHOD OF PLACING CONCRETE and equipment used in such operations are described in a pamphlet entitled "Vibration—A Better Method of Placing Concrete," published by the Portland Cement Association, 33 West Grand Ave., Chicago, Ill.

LAUNDRY WASTES as a source of trouble in sewage disposal and methods to be employed in treating them in sewage-disposal plants are the subjects of Bulletin No. 42, "The Treatment of Laundry Wastes," Agricultural and Mechanical College of Texas, College Station, Texas. Free upon request.

SPECIFICATIONS FOR NINE TYPES OF ASPHALT ROADS have been issued by the Asphalt Institute, 801 Second Ave., New York City. The types of construction covered are: asphalt macadam surface course; asphalt concrete surface course; stone-filled sheet asphalt surface course; sheet asphalt binder and surface course; asphalt macadam base; asphaltic concrete base; asphalt surface treatment or retreatment of old bituminous surfaces; asphaltic road-mix surface course (macadam aggregate); and asphaltic road-mix surface course (dense graded aggregate). These specifications, as they relate to surface treatment and road-mix types, show in detail the Institute's recommendations for low-cost road construction, as previously covered broadly in the Institute's road construction manuals. The hot-mix and penetration types are recent revisions of earlier Asphalt Institute specifications, with more detailed requirements covering improved equipment.

A SIMPLE FORMULA for estimating the height of capillary rise in a granular deposit has been developed by Prof. Yashichi Yoshida, professor of civil engineering in Kumamoto Technical College. Application of the formula is discussed in a small pamphlet printed in English by the Kumamoto Technical College, Kumamoto, Japan.

WIND PRESSURE ON TALL BUILDINGS as influenced by neighboring structures, the subject of an investigation using a model of the Empire State Building in the wind tunnel at the Bureau of Standards, is analyzed by C. L. Harris, head, department of architecture, Pennsylvania State College, in Bulletin No. 43, Engineering Experiment Station, State College, Pa.

New Books and Revised Editions

[*Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.*]

AUTOMOBILE FACTS AND FIGURES. Paper; 6x9 in.; pp. 96; diagrams and tables. National Automobile Chamber of Commerce, 366 Madison Ave., New York, N. Y. . . . *Statistics of motor-car operation and production, motor transportation, highway mileage, expenditures and taxes and related subjects.*

BRIDGES—By Henry H. Bormann. Cloth; 8x10 in.; pp. 78; photographs. Published by The Macmillan Co., New York, $2. . . . *A book for boys, mostly pictures and brief descriptions of the principal elements and types of bridges.*

GENERAL THEORY OF POLYCONIC PROJECTIONS—By Oscar S. Adams. Paper; 5x8 in.; pp. 174; diagrams and tables. Published by the Superintendent of Documents, Washington, D. C. 25c.

HOUSING AND SLUM CLEARANCE IN LONDON—By Hugh Quigley and Ismay Goldie. Cloth; 5x8 in.; pp. 227; photographs and tables. Published by Methuen & Co. Ltd., London, England. Price 7s. 6d.

HYDRAULICS—By Ernest W. Schroder and Francis M. Dawson. Cloth; 6x9 in.; pp. 429; photographs and line cuts. Published by McGraw-Hill Book Co., New York. $3.50.

NATIONAL RESEARCH COUNCIL — Transactions of the American Geophysical Union. Part I: paper; 7x10 in.; pp. 257. Part II: paper; 7x10 in.; pp. 633; photographs, tables and diagrams. Published by The National Research Council of The National Academy of Sciences, Washington, D. C.

NEW FEDERAL ORGANIZATIONS—By Laurence F. Schmeckebier. Cloth; 6x9 in.; pp. 199. Published by The Brookings Institution, Washington, D. C. $1.50.

PROCEEDINGS OF THE PUNJAB ENGINEERING CONGRESS, 1933—Cloth; 6x9 in.; pp. 332; photographs, numerous folding diagrams. Published by the Punjab Engineering Congress, Lahore, Punjab, India.

RIVETING AND ARC WELDING IN SHIP CONSTRUCTION—By Commander H. E. Rossell. Cloth; 5x8 in.; pp. 210; diagrams and tables. Published by Simmons-Boardman Publishing Co., New York. $2.25.

SLUM CLEARANCE AND REHOUSING—Paper; 9x11 in.; pp. 139; photographs, diagrams and tables. Published by P. S. King & Son, Ltd., London, England. Price, 10s. 6d.

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Editorial and Publishing Offices at 330 West 42d Street, New York

October 25, 1934

From Caisson to Cofferdam

THE MOST dramatic happening in this week's technical news is the abandonment of the use of a caisson for the south pier of the Golden Gate Bridge after the caisson had been floated into the fender ring built to protect it while it was being sunk at the pier site. Abandonment of the caisson, with the decision to use the fender ring as a cofferdam that can be sealed and pumped out, permitting the pier to be built in the dry, marks another step in the evolution of a remarkable structure. In foundation work change of plan is frequent if not usual, as the unknowns become known through actual construction. Under the severe conditions at the Golden Gate the occasion for change is multiplied; storms, powerful tidal currents and foundation rock of troublesome character are factors that easily take control over advance plans. When the full story of the south pier becomes known, these influences can be better appraised. But the broad truth of engineering experience is that often the exploration provided by actual construction exercises a dominating influence on the job, especially where preliminary knowledge of the physical conditions is inconclusive. Such situations bring to the front the great characteristic of true engineering, which is the ability to meet conditions as they arise. They emphasize anew that flexibility is one of the indispensable attributes of the engineering mind.

Facts Belie Theories

A REPORT of the recent American Federation of Labor convention states that, under the new line-up of building trades within the federation, there will be no more jurisdictional disputes. Hard facts, however, belie this fine theory. In New York the Boulevard Gardens Housing project has been tied up for nearly two months by a jurisdictional dispute between carpenters and steamfitters over the petty question of which trade is to cut holes through the floors for the steam pipes. If the A.F. of L, has found a way to end jurisdictional disputes, why has this one gone on for two months, depriving 600 men of needed work? And what has the PWA, which made a large loan to the project to provide employment, done about it? Is its stand-by attitude an admission that, despite the creation of local, regional and national boards for the settlement of labor disputes, the refusal of a few steamfitters to arbitrate can bring the entire NRA labor adjustment machinery to a standstill?

Investigate Beltsville

DAY-LABOR CONSTRUCTION of the Beltsville, Md., research center of the Department of Agriculture has precipitated a situation that needs thorough airing and a complete, impartial investigation. With PWA funds the department undertook to build a group of buildings, mostly by force account. Either the program was too ambitious for the funds available, or costs greatly exceeded the estimates, for last week $450,000 more was allotted by PWA to complete several partly finished buildings. The Associated General Contractors protested against the adoption of day-labor methods at the start, and followed up the protest with an investigation after construction was well under way. Resulting charges of poor and wasteful construction, inefficiency and gross violation of working-hour and wage provisions have brought only evasive and unsatisfactory answers from department officials and implication that the day-labor construction was superior to the contract work on the jobs. With few exceptions, federal bureaus know little about large construction operations, yet here is an example of one being permitted to conduct such operations under the misguided plea of "saving money and employing more men." Beltsville, therefore, offers an excellent opportunity for a searching investigation into the growing practice of authorizing governmental departments that have no capable supervisors of construction to undertake important construction operations.

Carpet Surfaces for Roads

THE SURPRISING WEARING QUALITIES of thin bituminous surfaces for roads are again forcefully exemplified by the experiences of Los Angeles County, described in this issue. This success of thin surface carpets depends, as every other record of previous successes has shown, upon a stabilized subgrade. Under some conditions this firm and durable base can be a product of proved treatments of the natural soils, and in other cases these soils must be replaced with other materials in masses sufficient to create subgrade stability. In substance this is the only difference in the current contentions of the thick road and the thin road advocates, when the two really meet on the common ground of the same road class. Often this is not the case; one is considering primary and the other secodary road requirements. The thin bitumen surface and the stabilized natural soil subgrade are in the class of secondary road construction, and the fact that they sometimes serve heavy traffic does not alter the classification. The carpet surface often meets secondary road requirements exceptionally well, and its logical use as in Los Angeles County is a possibility that the road engineer can profitably keep in mind.

Not Least of Our Resources

THAT BUSINESS ORGANIZATIONS built up through years of patient development have disintegrated and vanished in the last few years is known to every observer. It was inevitable that this should happen in the progressive disappearance of business. The loss is great, for these organizations are not the least of the country's resources; in their aggregate, indeed, it is they rather than material wealth that represent the net product of our four centuries of growth. By the same token the resumption of normal economic existence is largely dependent on returning this organizational system—in industry, in professional service, in commerce—to its normal functioning. One of the first conditions of any recovery campaign should be that it shall maintain and utilize these organizations. Whether it be the trained staff of the engineer's or architect's office, or the specialized organization of the contractor, it is an asset that should have fullest consideration in setting up construction programs, whether of the CWA or PWA type or any other

emergency kind. But this very requirement has been grossly neglected, at times even deliberately ignored, in the plans of recording agencies, both federal and local. Worse yet, the offer of service on the part of such organizations to take part in recovery work was often scorned as tainted with self-interest and the desire to take toll of philanthropy. This attitude of over-zealous conscientiousness on the part of public men has contributed not a little to making the succession of Washington relief measures sterile and short-lived. Future recovery work can be made far more fruitful, we feel certain, through a changed attitude based on better understanding of the value of trained organizations.

Is Housing the Answer?

THE PRESIDENT'S press conference statements last week relative to proposals to be made to Congress for a greatly augmented housing program seem more a trial balloon than a plan. They merely mirror the housing dilemma: Is housing the answer to the question of business stimulation and reduction of unemployment, or is it a will-o'-the-wisp that will forever promise great returns and yet will continue to elude our grasp?

It is important to recognize just what the proposals include and to appreciate some of the inherent difficulties. The billions of dollars that have been mentioned would be spread over: (1) low-cost housing in urban slum areas, an expansion of the PWA Housing Division's present work on federally financed and owned projects; (2) low-cost housing, with or without slum clearance, by limited-dividend corporations under FHA sponsorship and mortgage insurance, a new undertaking; (3) more subsistence homesteads, federally financed, to be built by the Department of the Interior, preferably near industrial centers; (4) more rural rehabilitation projects, federally financed by FERA, to form the nucleus of new communities that might attract industrial enterprises to locate in them; (5) more remodeling by private owners, such as is now being done under Title I of the National Housing Act; and (6) new residences, privately financed, which it is hoped will be stimulated by the mortgage-insurance plan of this same act. Private financing is heavily counted upon in the proposed program, so that it does not involve the huge federal expenditures that at first glance seem to be implied. It will also be noted that no new legislation is needed to put the whole program into effect. A speeding up and an expansion of the present programs is all that is involved. But such a speeding up will require greatly expanded organization, new policy determination and the solution of many problems as yet hardly touched.

Evidently the Administration hopes that the resulting housing construction would provide employment faster and in greater volume than would more non-federal public works under the present perfected PWA. But this is only a dim hope. It is also only a hope that the housing projects will all be self-liquidating, an argument advanced in their favor over public works such as waterworks, roads, grade-crossing eliminations and sewage-disposal plants. Better housing, on the other hand, is needed of a certainty. If large expenditures on housing could produce the returns in employment and reduced relief expenditures that are claimed, they would be economically and socially justified. But there the dilemma stands. Is it housing on a grand scale or more public works? There is good reason to believe that a compromise solution would be more effective for recovery as well as socially useful, all things considered.

A Call to Service

DEPENDENCE of the highway industries for roadbuilding business during the next three years rests in the execution of the Hayden-Cartwright Act passed by the last Congress. This act authorized liberal federal aid, wrote off federal loans previously advanced, renewed the requirement of equal money partnership by states and imposed penalties for state diversion of road-user taxes. No more constructive piece of highway legislation has been enacted by Congress since the original federal-aid highway laws were passed. It remains for the roadbuilding industry to see that its full value is realized.

The legislation of these new federal-aid highway provisions is not to be assumed to have been accomplished easily. Instead the task required the most persistent and concerted efforts ever brought to bear in seeking federal participation in highway improvement. Washington opposition was strong in high executive quarters. It still remains strong. Administration minds were directed to more spectacular means of getting men to work, to divers schemes for social regeneration. Against this spirit the only organized force lay in the roadbuilding associations, scantily equipped with funds for fighting the battle. They remain the only army able and ready for the battles that are to come.

To win these battles is vital to the continuance of efficient highway transportation service. Built up by heavy imposts laid on road users, this service has a claim for positive support by the industries whose prosperity in the past has been built up by its generous tax contributions—which amount to hundreds of millions of dollars every year. A winning fight for Congressional action that will put constructive force into the Hayden-Cartwright Act is a fight for the public good. The highway industries associations therefore are under a public duty to carry on strongly through the coming sessions of the national legislature.

An authorization act is not an appropriation act, and the Hayden-Cartwright law is only an authorization act as it stands. Congress has yet to give it force by *appropriation* of the funds authorized, and it is to obtain this action that roadbuilding interests have to bend efforts through their associations during the months of the coming Congress. These associations need money for the work to be done. They are not asking extravagant amounts, and the individuals and businesses that find their livelihood in highway improvement have the duty of seeing that these sums are made available.

In the past, roadbuilding programs have been handed to contractors and manufacturers by legislatures and the people. A gift market for the highway business is no longer the disposition of either. Rather they are disposed to curtail highway expenditures, to meet what they consider to be the more pressing needs of relief and other worthy government activities that have been worse pinched by the depression. The necessity of creating a market confronts the highway industries in greater measure today than ever before during the years of its growth to recent magnitudes. They must now work for their place in the sun, and their first labor lies at hand in the financing of organized association activities in the coming Congress.

CURRENT NEWS

Expanded Housing Program Proposed By President

Washington Correspondence

A HOUSING PROGRAM "with a great many ramifications" will be included in President Roosevelt's proposals to Congress. This assures liberal appropriation for both low-cost urban housing and semi-urban and rural housing which FERA regards as fundamental to rehabilitation of families now on relief rolls. Projects of the latter type are exemplified by the Wood Lake community in Trinity County, Texas, and Red House, near Charleston, W. Va.

In Raleigh, N. C., the last of seven limited dividend projects financed by $11,500,000 of PWA funds soon will be ready to start. The other six are Hillside and Boulevard Gardens in New York; Juniata Park in Philadelphia; Neighborhood Gardens in St. Louis; and individual residence projects in Alta Vista, Va., and Euclid, Ohio. The Federal Housing Administration expects to carry on this method of providing low-cost housing where PWA left off to go directly into construction combined with slum clearance in Cleveland, Chicago, Cincinnati, New York, Atlanta, Detroit, Indianapolis, Montgomery, Ala., and elsewhere. Unlike PWA's policy which limited the utility of the limited-dividend corporation, FHA does not propose to require that construction of low-cost housing be combined with slum clearance in every instance.

Subsistence homesteads

Under the Subsistence Homesteads Division of the Interior Department 63 projects are in various stages of development with 500 homes under construction or under contract on 20 projects, and 24 more projects are under consideration. The emphasis is on projects located close to large industrial centers affording enough employment to provide homesteaders with some cash income. In rural projects the Subsistence Homesteads Division has been forced to countenance production of farm products for sale. Probably because of the small volume of such production, President Roosevelt does not regard the sale of produce by the rural rehabilitation and subsistence homestead communities as inconsistent with AAA crop control.

Financed by federal funds all these types of housing development are admittedly experimental but presumably self-liquidating. With the National Housing Act which is an attempt to mobilize private capital in building modernization and home mortgage financing, they represent the government's pioneer effort in housing and out of them will develop the administration's policy fostering a long-term housing program. In drafting this program, the administration will consider the suggestions made by the European experts who recently completed a tour of American cities.

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Sewage Patents Also Upheld By Judge in Chicago Case

One activated sludge patent in the case against the Sanitary District of Chicago was held invalid by Judge W. C. Lindley, presiding over a district court. Six patents were involved in this case but four were the same upheld by the Supreme Court in the Milwaukee case. The sixth patent, 1,341,561, issued May 25, 1920, on spiral flow, was held invalid as it covers only "the exercise of mechanical skill in adapting a structure to such form as will best promote general and complete circulation with the least possible friction." The fifth patent was similar to the four and held infringed.

Plants at Calumet, DesPlaines and North Side have infringed and continue to do so but Judge Lindley refused to issue an injunction on the ground that to enjoin the operation would work an irreparable damage upon the health and lives of the people served. The entire opinion indicates that the decision of the district court is impelled by the opinion of the court of appeals upon which the U. S. Supreme Court recently denied certiorari.

Flood in Los Angeles Damages Area Stricken Last January

Following a 5-inch rain on Oct. 17-18, flood conditions in the Montrose-La Crescenta suburban area of Los Angeles, Calif., approximated those following the disastrous storm and flood of last January. More than a score of houses were damaged and streets and highways were covered with debris as flood waters swept down from the foothills and canyons. There was no loss of life.

The county board of supervisors has made provision for the expenditure of $4,150,000 for the construction of flood control reservoirs to protect this area, provided the $26,330,000 bond issue to be submitted to the voters on Nov. 6 is passed.

Five Bidders Offer Same Price For Fort Peck Dam Cement

Five identical bids were received for 635,000 barrels of cement for the Fort Peck dam spillway when the proposals were opened Oct. 16 at the Kansas City division office of the Corps of Engineers. The price was $2.5054 per barrel in bulk (600,000 barrels) and $2.7145 per barrel in paper bags (35,000 barrels).

In the call for bids the government had specified the price to be quoted at the bidder's plant and stated the award would be made on the basis of the lowest cost to the government at the site, taking into consideration freight reduction on land grant railroads. The unit prices submitted by the bidders were f.o.b. the Fort Peck dam site and not at the mill.

Sewer Contractor Abandons Work On Large Half-Completed Project

The Chippewa Plumbing Co., of Buffalo, has abandoned its $964,000 Lovejoy-Fillmore sewer contract in that city after completing nearly half of the project. In giving reasons for termination of the contract, Carl L. Johndahl, president of the company, is reported to have said he was unaware at the time of bidding that the project was to be financed by PWA and therefore subject to certain restrictions resulting in higher costs.

Bids were taken in July, 1933, although the contract was not awarded until January, 1934. An excess of rock of 20 per cent over that contemplated is also given as a reason for increased costs. Estimates for the work have been paid in excess of $400,000. The bonding company will pay back wages amounting to $6,000, or more, and is keeping pumps going and excavations barricaded pending decision as to future action. The city plans to re-advertise for the completion of the work.

Beltsville Project to Be Completed By Readjustment of Funds

(Washington Correspondence)

TRANSFER of $450,000 needed to complete several partly finished buildings at the Beltsville, Md., research center of the Department of Agriculture was authorized by PWA Oct. 16. This "deficit" in the Beltsville project will not be covered by new money, but by deducting necessary funds from other allotments previously made to the department. This action is intended to discourage further publicity concerning the management of the project to which PWA originally allotted $2,481,017, also to save the department from further embarrassment in trying to explain matters to the satisfaction of the general accounting office.

Believing that if day labor were employed allotments made by PWA could be stretched to include more work than could be accomplished on a contract basis, the department did most of the building on force account. A protest against adoption of this practice was made several months ago by Edward J. Harding, managing director of the Associated General Contractors of America. In response, Asst. Secretary of Agriculture Tugwell pointed out that several buildings are being contracted and sought to justify the use of day labor on others "by the splendid record of accomplishment to date" (May 17). Administrator Ickes informed the AGC that on federal projects the procedure, whether by contract or force account, is discretionary with the department involved.

Investigation by Burt L. Knowles, member of the AGC executive board, revealed that although the men were paid and recorded as working 30 hours per week, the

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TVA Decides to Buy Cement From Commercial Producers

A decision to buy the 6,000,000 barrels of cement required for TVA construction operations from commercial producers has been announced by Arthur E. Morgan, chairman of the Tennessee Valley Authority. This decision was made following studies of the possibility of the authority building its own cement plant. The decision was reached after the opening of bids, Oct. 15, which set the price for cement delivered to the two dams now under construction at $1.7384 a barrel for Norris Dam and $1.8798 a barrel for Wheeler Dam. The two dams will require about 1,500,000 barrels.

The following statement made by Chairman Morgan reviews the situation and indicates the basis for the decision:

"For several months the authority and the cement industry have conferred in a study, first to determine what is a fair price for cement, and second, what it would cost the authority to make cement on the Tennessee River at Sheffield, Alabama, where both raw materials and cheap power are exceptionally available, and what it would cost to ship it by cheap water freight to the dam sites on the river.

"The authority and the cement industry did not come to full agreement, either on a fair price for cement, or on the cost of making cement at Sheffield. There was fairly complete agreement as to direct manufacturing costs, the principal differences being on such items as interest, depreciation and selling costs. The authority was willing to pay more than it believed to be the probable cost of making cement at Sheffield and delivering it to the dam sites, rather than to construct and operate an additional plant in an already overbuilt industry. The authority believes that the price it is willing to pay is reasonable and fair under all the above circumstances. The cement manufacturers, on the other hand, rather than to have another plant built, have bid prices which they hold are less than fair prices, especially at the low rate of production now prevailing in the industry, and they have met the maximum price which the authority was willing to pay."

Temporary Suspension of Work at San Gabriel Dam No. 1 Asked

A temporary suspension of construction operations on San Gabriel Dam No. 1 has been requested by the chief engineer of the Los Angeles County Flood Control District, pending the formation of a new construction program which would involve redesign of the structure. The contract for building the dam is held by the West Slope Construction Co., which has been carrying forward preliminary operations, including excavation at the site and quarry stripping, for the past year.

The request of the chief engineer, Samuel M. Fisher, was made in accordance with the reports of two consulting boards (*ENR*, Oct. 18, 1934, p. 510) that a modification of design was advisable. They contemplate a flattening of the side slopes to provide a broader base and the use of material from the quarry which would have been classed as waste under the specifications that constitute the present basis of construction operations.

Caisson for Golden Gate Bridge South Pier Placed, Removed and Use is Abandoned

THE CAISSON built to be sunk inside the south pier fender ring of the Golden Gate Bridge at San Francisco was towed to the site on Oct. 9 and successfully maneuvered into the fender. Even the low ground swells running at the time, however, tossed the caisson about and made it difficult to prevent the inner side of the incomplete fender ring from being battered. The risk entailed by the possibility of a storm during the two weeks before the eight remaining sections of the fender could be put in place made it seem advisable to abandon the plan for using the caisson. Therefore, on the same day it was put in, it was removed, towed back to Oakland harbor where it was built and work was begun on closing up the open end of the fender. The contractor (Pacific Bridge Co.) plans to complete the pier without use of the caisson. The method of construction originally proposed is described in *ENR*, April 26, 1934, p. 541.

Prior to bringing the caisson to the pier, fourteen of the twenty-two concrete sections which constitute the elliptical fender wall, 155x292 ft. in plan, had been completed up to their final height from about El. —100 to El. 15, the remaining eight, on the east end of the fender, had been stopped at El. —40, leaving an opening through which the caisson could be floated into place. The unfinished sections were to have been brought up to El. 15 after the caisson was in place and ready for sinking.

The caisson is a box-like structure 90 ft. wide, 180 ft. long and 75 ft. high. It weighs 1,080 tons, contains 4,000 cu.yd. of concrete in the bottom and has a draft of 28 ft. The caisson was to have served two functions: (1) to save concrete by forming up, with timber, around those places in which concrete was required for tower supports and (2) to provide an interior working chamber through which there was to be access to the foundation rock.

Last June, at a time when the caisson already had been completed, the construction plan was changed and eight open-bottom, steel chambers of semi-spherical shape, 15 ft. in diameter, were set on the foundation rock, their tops connected to vertical steel tubes about 5 ft. in diameter to serve as access wells through the seal concrete. Locks are provided at the top of these wells and the chambers are to be unwatered and used for inspection of foundation rock in the dry under pneumatic pressure. The concrete seal, placed by tremie to a depth of 35 ft., covers these semi-spherical bases and surrounds the vertical wells that lead to them.

Although the seal concrete covers much of the foundation work within the fender, the steel chambers maintain access to a representative portion of the rock and not only facilitate inspection, but even make possible further foundation work if that should prove desirable later. This change in plan really made the caisson unnecessary but because it was already built, endeavor was made to use it and perhaps thereby effect a saving in the cost of the work. The attempt on Oct. 9, however, proved this to be impracticable.

Now that the caisson is not to be used, the wells leading to the inspection chamber will be extended above El. —50 and tremie concrete will be placed to thicken the seal to 50 ft. Then the fender ring is to be pumped out and the pier proper built in the dry on top of the seal concrete.

CAISSON FLOATING IN FENDER RING AT SOUTH PIER SITE

Construction Code Compliance Efforts Are Increased

EFFORTS towards securing compliance with provisions of the construction code have been intensified through the various code authorities and the National Recovery Administration. Late reports from NRA indicate that many cases alleging under-payment of code wages have been investigated and restitution made by employers. Trade practice complaints committees are in operation by the General Contractors' Divisional Code Authority and several other divisional groups in the construction industry including the electrical contractors, tile contractors, plumbing contractors and others. These agencies of self-government are handling promptly complaints of non-compliance, particularly as to competitive bidding practices.

Government contracts

Code compliance on government contracts is handled by a specially constituted office of the NRA Compliance Division, known as the Government Contracts Branch. Its basis of jurisdiction is Executive Order No. 6646 issued Mar. 14, 1934, requiring, among other things, that all persons who bid to the federal government, any of its agencies, or to a state, municipality or local subdivision on any project financed wholly or in part by federal funds must sign certificates that they are complying and will continue to comply with all codes of fair competition to which they may be subject. Compliance certificates are furnished by PWA and other governmental agencies. NRA has given its disapproval to lists prepared by local organizations purporting to give the names of members of the industry who are in compliance with the various codes; it has ruled that the determination of each case must be made on its own merits and peculiar set of facts involved.

Complaints of non-compliance against those who bid on or receive government contracts may be filed by anyone directly with the government contracts branch. Local NRA compliance officers apparently lack the power of decision on government contracts, but may be called upon to aid in gathering the necessary data. Requirements for the filing of a complaint are simple, made so expressly for the purpose of reducing red-tape and expediting the handling of cases. Complete information, however, is necessary, including the name and address of the firm complained against, identification of the project, including the project number if available, pertinent data regarding the project, such as the date of invitation, date of opening of bids, date contract was awarded, name and address of awarding authority and reference to the specific provisions of the code allegedly violated.

Large Conservation District Considered by Texas Legislature

A proposal to create the Brazos River Conservation and Reclamation District which would embrace a group of counties of Texas aggregating 28,000,000 acres, was favorably reported by committees in both the house and senate of the Texas legislature and, after extended discussion, received the approval of the lower branch. As presented, the bill would also create the Colorado River Authority for the purpose of completing the Buchanan Dam and power plant on that stream at a point about 50 miles above Austin.

The Brazos River measure would create a district under state control which would ultimately involve construction of a series of dams and other reclamation and conservation work to cost about $50,000,000.

Water Conservation Association Organized in States of the Great Plains Area

AT AN organization meeting, representatives of eight states in the Great Plains area of the eastern slope of the Rocky Mountains formed the Water Conservation Congress for the purpose of fostering water control and conservation in that region. The meeting was held at Trinidad, Colo., Oct. 10, following the formation of a tentative organization a month earlier which was called the Plains States Floodwater Conservation Association. In addition to water conservation, the member states of the new organization propose to work together in other matters affecting general development of the natural resources of this region.

The following officers were elected: F. L. Vaughan, Woodward, Okla., president, and J. C. Caldwell, Trinidad, Colo., secretary-treasurer. The work of the organization will be carried under the direction of a board of vice-presidents from the member states, who will elect an executive committee.

One of the principal speakers at the organization meeting was Congressman Martin, Colorado, who discussed bills pending before Congress and pointed out the desirability of pooling common interests in flood control and water conservation throughout the Plains States. It was brought out at the meeting that in the past there had been a notable deficiency in the exchange of ideas and aid between the northern and southern states in this area. Commercial and transportation developments have usually proceeded in an east and west direction, although as far as problems of flood control and water resources are involved the area from the Dakotas south to the Panhandle of Texas is very similar. One of the primary purposes of the organization is to foster this interchange of ideas on matters of conservation in this tier of states.

The delegates at the meeting reported on water conservation developments in their states. These speakers included Thomas M. McClure, state engineer of New Mexico, W. C. Burnham, Oklahoma City, and Claude Rightmire, Enid, Okla. The next meeting of the organization is scheduled for early in December at a place to be selected by the executive committee.

City Managers Hold Conference at St. Louis

A MORE EFFICIENT government to meet a more efficient mechanized industrial age was the keynote of the proceedings at the conference of the International City Managers Association, meeting on Oct. 15-17 in St. Louis. From the first session, in which thirty managers spoke three minutes each on their most difficult problem, usually financial, to the address of C. A. Dykstra, city manager, Cincinnati, on "The Challenge of Urbanism," all presentations related to better efficiency, quicker and more effective results for the citizen and the utilization of those straight-to-the-point methods for which the engineer is specially trained.

"Today," said Mr. Dykstra in his address, "We ask of government something positive and optimistic. We are beginning to think of government as having a creative function, as molding our environment and shaping society. With this change we have re-interpreted the 'right of the individual' to include much more than the simple protection of his life and property.

"Above all else—above size, area, property value, industry and business—the city is a way of life. It has always been a way of life. The interruptions caused by our century of industrialism and our fling at land speculation must soon be over and we must return to a program in which the city finds its true objectives. For the city should be a device for getting satisfactions out of life. It should have objectives which clearly transcend the material ambitions of individuals who are its citizens. In our dreams the city of the future is something beautiful, with a plan of growth and a contented and happy people. It is a balanced structure full of opportunity for work and play. There is enough industry to provide for the needs of all but not so much that we cannot use our products for lack of purchasing power. The machine has become the servant and not the master of man. It is a civilization that we are creating—a harmony of the necessary and the good things of life. So let us have a comprehensive plan and a pattern to work to. Let us reconstruct our slums and rehabilitate our blighted areas; let us organize for civic achievement as we have been doing for business and industry; let us measure our city, not by size or by numbers but by its result in terms of human beings. We in America have not yet scratched the surface of the possibilities of life for all—a life promised by our boundless resources. We have yet to plan the framework for a future of abundance. Let us set about this planning—comprehensive planning—with goodwill and courage, and let us begin now."

City problems

Particularly difficult individual problems of various cities described at the meeting included the following:

Health facilities, including hospitalization, milk inspection and sanitary inspection, were subnormal in Paducah, Ky., according to L. V. Bean. In Asbury Park, N. J., the greatest problem comes from the increase of population from 15,000 in winter to 120,000 in summer with peak tour-

ist days of 500,000 to 750,000. Water supply demand rises within two weeks from 750,000 to 4,500,000 gal. daily. The sewage disposal plant is then also overloaded. Increased traffic requires increased police forces. C. H. Bischoff is city manager of Asbury Park.

Bluefield, W. Va., reported Kyle Bruce, has financial trouble consequent upon reduced valuations and levies and high tax delinquencies. Street lights were turned out and jails were opened to reduce expenses. Seth Burnley, Charlottesville, Va., outlined welfare administrative difficulties resulting from an attempt to handle welfare work by an independent board.

Asheville, N. C., had an arterial highway projected through the town via a bottleneck. G. L. Hackney arranged private community financing to cut back two buildings, 8 and 10 ft. each. Forty or fifty oil-transport trucks coursing through the business district is Arkansas City's (Kan.) worst problem. Rerouting the trucks through the residence district brought severe complaints from property owners. According to Clyde B. King this problem has not yet been solved.

L. W. Monroe, Ellwood City, Pa., a steel city, reported that his community needs storm sewers but has no way to buy material so as to take advantage of work relief labor. Carl A. Peterson of Muskegon, Mich., said that his city is suffering from the 15-mile tax limitation. He feels that school costs will have to be carried by the state.

Royal Oak, Mich., a residential suburb of Detroit, has grown from 6,000 in 1920 with 4 miles of paving to 23,000 in 1930 with 11 miles of paving. The community is suffering, said E. M. Shafter, from over-development and a $9,500,000 debt burden. Services have been cut to a minimum standard.

Maintaining contact with the public was discussed in ten different aspects at the meeting, including office calls by citizens, complaint handling, newspaper relations, budget hearings, annual reports, special leaflets, civic groups, radio broadcasts and motion pictures. Newspapers appeared to be considered of first importance, then contact with civic groups. Only five cities use the radio. This medium of contact seems to have been of more value as an advertising medium of the city outside of the city itself.

That relief of 8,000,000 unemployed should be cared for by the federal government and the unemployables by local government was the theme of C. M. Bookman, director, Community Chest, Cincinnati, and Paul V. Betters, Director, U. S. Conference of Mayors.

Suggestions were made by Stephen B. Story of Rochester, N. Y., that PWA wage rates be made more flexible, that PWA rules should provide an incentive for cities to save money, i.e. build projects which would save on operating and maintenance costs, and that less red tape should be required. John N. Edy, Dallas, Tex., in discussing the subject said that wage rates and codes should be adjusted and a single interest rate should not be set. He stated his belief that costs of supervision and inspection of PWA work can be cut materially. He also gave the opinion that public works expenditures is a way to recovery, but that PWA should realize that the contract is between the city and contractor, not between PWA and the contractor.

Tacoma Building Collapses Under Heavy Load of Groceries

Failure of a brick column in the front wall of the six-story Tacoma Grocery Co. building, Tacoma, Washington, on Oct. 9 precipitated the crash of a portion of the upper three floors, dumping debris and grocery stock into the street which fortunately was deserted at the early hour at which the accident occurred. Firemen who were in the building at the time attempting to locate a sprinkler leak which had turned in an alarm also were unhurt. It is believed that the sprinkler pipe was broken by deflection of the fourth floor under a heavy concentrated loading and that the released water contributed to the failure by causing the stock of merchandise to become waterlogged. No information is available on the load concentrations although a posted

WRECKAGE OF BUILDING IN TACOMA WHICH FAILED UNDER HEAVY CONCENTRATED LOADING.

notice on a column inside the building stated that "this floor will carry with apparent safety 350 lb. per sq.ft."

As shown in the photograph the building is of semi-mill type construction, with brick walls and timber interior. It is 75 ft. wide in front and 120 ft. deep. There are two brick columns in front and two rows of timber columns for the length of the building.

Work Starts on Third Cofferdam at Wheeler Dam Site

A third cofferdam is under construction for the Wheeler Dam of the TVA on the Tennessee River to permit unwatering an area about 1,200 ft. long by 200 ft. wide. With the unwatering of this area, there will be more than 23 acres of the river bed available for the construction of the dam foundations. The work started at the south bank of the river and, with the construction of this third unit, the cofferdam area extends about 4,000 ft. into the river which has a width of about 6,000 ft. at this point.

Sponsors of Grand Coulee Project Begin Move to Urge High Dam

Definite plans are being formulated by the interests in the state of Washington which sponsored the Grand Coulee Dam project to show the feasibility of having the development expanded to include the ultimate high dam and the accompanying extensive irrigation program.

At a meeting of the Columbia Basin Commission, scheduled for Oct. 26, it is expected that an engineer will be selected to make further power-use surveys and to consolidate previous data on the large-scale project. The secretary of the commission, according to reports, considers this the next important step in the general campaign to have the federal government proceed with construction of the high dam and he is confident that the survey will demonstrate the capacity of the power market so definitely that the President and Congress cannot fail to appreciate the value of continuing on the basis of the larger program.

As another development in this situation, the Columbia River Development League has been launched to enlist statewide support for the high dam project, and a definite 5-year program has been outlined to promote the objectives of the high dam and the ultimate reclamation of more than one million acres of land in the Columbia Basin. This is the objective of the new league and the organization contemplates close cooperation with the Columbia Basin Commission, the Washington Planning Council and other organizations.

Under the existing contractual agreement with the organization starting the construction of the low dam, estimated to cost $63,000,000, if the government decided to change to the high-dam project before the work was too far advanced it could pay the Mason-Walsh-Atkinson-Kier Co. the cost of the work done to date plus 10 per cent and proceed to readvertise for the larger project.

Contracts Totaling $14,125,000 Let For Colorado River Aqueduct

Contracts totaling $14,125,000 were awarded this week for several schedules of the 110 miles of cut-and-cover concrete lined canal and monolithic concrete siphons on the Colorado River Aqueduct project for which bids were opened Oct. 11. The awards were made by the Metropolitan Water District of Southern California, F. E. Weymouth, general manager.

The successful bidders, the schedule number and the amount of the bid follow: (A) Hanrahan Co., Youdall Construction Co., Elliott, Stroud Bros. & Seabrook, C. Harlowe, Jr. and C. M. Elliott (joint bid), Schedule 1, $1,036,774; Schedule 10, $819,505; Schedule 11, $973,227; Schedule 13 $632,037 (B) Barrett & Hilp, and Macco Const. Co., Schedule 2, $1,094,992; Schedule 3, $974,754; Schedule 7, $853,461 (C) Jahn & Bressi Const. Co., Schedule 4, $704,318; Schedule 5, $715,057 (D) C. W. Wood and M. J. Bevanda, Schedule 6, $400,884; Schedule 8, $881,717 (E) Utah Const. Co., Schedule 9, $955,249 (F) Three Companies (New Mexico Const. Co., W. S. Broderick and D. G. Gordon) Schedule 12, $1,313,272 (G) Thompson Starrett Co., Schedule 14, $926,961; Schedule 15, $1,028,047; Schedule 16, $814,921.

Beltsville Project Resumed

(Continued from p. 540)

requirement on PWA projects, many of the crews were working 40, 42 and 44 hours. It was learned that plasterers and stucco workers on force account were paid at the rate of $1.10 per hour, whereas the Northeastern Construction Co., Baltimore, was obliged to pay the same trade $1.50 an hour.

Dr. E. W. Sheets, chief of the animal husbandry division of the bureau of animal industry and coordinator in charge of the Beltsville construction program, defended the force account work by stating:

1. That the department had made an excellent record with respect to economy of operation and he was convinced that his employees could perform this work very much cheaper than the bids which might be received from general contractors.

2. That the workmanship of his own forces was as good and generally superior to that produced under the contract system.

3. That the work performed by day labor was invariably carried on more expeditiously and, in general, more satisfactorily, than had been experienced where the work had been performed by contract; and

4. That the activities of his department had provided work for many hundreds of unemployed workers.

To all of these claims the AGC demurred, pointing out that general contractors under specification on hundreds of PWA projects are employing men off relief rolls, and declaring that "if government agencies are to continue to employ new production capacity and to compete with private enterprise without reference to the rules of the game, the industry can hardly be expected to survive and continue its cooperation with the President's program."

In response to the AGC's brief, Harry Slattery, for Administrator Ickes, wrote under date of June 6 that "It is believed Dr. Tugwell will adjust the matter in a manner which will be most satisfactory for all concerned."

Secretary Tugwell's answer was that "the Department expects to follow a procedure of construction which, after careful consideration of the conditions affecting each project, seems best."

Work at standstill

That was the situation on June 5 last. Since then all stages of construction work at Beltsville have come to a standstill because of the exhaustion of funds. Dr Sheets has been transferred to Florida. Not until it was officially admitted by the Department of Agriculture, however, that "there has been juggling of funds and that some officials have exceeded their authority" did the PWA board act. Transfer of $450,000 to complete the project will deprive the Forest Service of $400,000 and the Biological Survey of $50,000 of PWA funds.

Failure to complete the Beltsville projects with the funds originally allocated was due, according to Administrator Ickes, to the fact that they were stretched to include several projects that had not been authorized by PWA. Explaining that these projects will be needed, Administrator Ickes said that there has been no doubt of the good faith of the Department of Agriculture. "There may have been an excess of zeal on the part of some employees but there has been no suspicion at any time of graft or malappropriation of funds," said Administrator Ickes.

Missouri Commission Bars Trucks from New Highway Link

Forty-one motor trucking companies operating in and out of St. Louis were barred from the use of highway No. 66 by a ruling of the Missouri Public Service Commission. In place of using this new highway link between St. Louis and Gray's Summit, Mo., the truck companies were ordered to use highway No. 50, the older route. The trucking companies, at a hearing held by the commission several weeks ago, contended that they should not be barred from the new highway, but the commission took the position that these highways were built primarily for the benefit of the traveling public, other than those engaged in transporting freight and passengers for hire, and that they were not for the purpose of advancing commercial interests of any common carrier. In its final order barring trucks from highway No. 66, the commission did not go into the question of the public's prior rights to highways as compared to those of the commercial users.

President's Housing Program

(Continued from p. 540)

It is not likely that the President will propose any further legislation when requesting funds from Congress. In Title II of NIRA and the National Housing Act the lines have been pretty well established for housing which involves government loans and the investment of private capital in low-cost projects and residential construction. FERA funds will cover subsidized operations and there is a possibility that FHA and FERA will work out a joint program of some sort.

Apart from the President's statement that community housing of the rehabilitation and subsistence types is an ideal method of getting rid of relief and giving a new chance to families on relief rolls, there is no indication of the extent of the housing program during the coming year. PWA Administrator Ickes is strongly in favor of spending a great deal more money for slum clearance and regards favorably loans to municipalities for this purpose. Projects undertaken by the PWA Housing Division (consisting of land acquisition proceedings to date, except in Atlanta) since it shut down on any further loans to limited-dividend corporations total $73,000,000. Forty cities have asked PWA to undertake low cost housing projects totaling $138,500,000, but beyond this nothing can be done until another appropriation is made by Congress.

Not averse to building up sentiment for a large appropriation, Secretary Ickes says that PWA could use $1,500,000,000 or $2,000,000,000 for housing and slum clearance during the next year. "The Housing Division is prepared to undertake any program that the President will approve and I think," said Mr. Ickes, "that Congress will continue to appropriate the money within its means to meet public needs."

Questioned whether he anticipates any opposition to the increasing scope of the government's operations, Mr. Ickes asked whether "you ever heard of the owners of rotten, old run-down property wanting new and commodious housing built in the next block?" "We are not going to permit the owners of slum property to determine our housing policy," he declared.

Hermann von Schrenk Elected President of A.S.T.M.

Herman von Schrenk, consulting timber engineer, St. Louis, Mo., and senior vice-president of the American Society for Testing Materials, was elected president, Oct. 9, on action taken by the executive committee in filling the vacancy resulting from the death of W. H. Bassett. Mr. Bassett died July 21, soon after his election as president of the society at the annual convention in June.

The vacancy created by Dr. von Schrenk's election was filled by the appointment of H. S. Vassar as senior vice-president. Mr. Vassar was elected vice-president last June. A. C. Fieldner, chief engineer, Experiment Stations Division, U. S. Bureau of Mines, has been elected junior vice-president. No action was taken to fill the unexpired term of Mr. Fieldner as a member of the executive committee.

W. W. Brush Becomes Editor Of Waterworks Publication

W. W. Brush, who on May 31, 1934, retired from his position of chief engineer of New York City's Department of Water Supply, Gas and Electricity after 40 years service with the department, has been made editor of *Water Works Engineering*. Mr. Brush assumed his new duties beginning with the October 17 issue of that publication. He will have associated with him the magazine's existing editorial staff, which remains intact.

SOCIETY CALENDAR

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual convention, Santa Fe, N. Mex., Nov. 12-15.

INTERNATIONAL ACETYLENE ASSOCIATION, annual meeting, Pittsburgh, Nov. 14-16.

HIGHWAY RESEARCH BOARD, annual meeting, Washington, D. C., Dec. 6-7.

AMERICAN ROAD BUILDERS, annual convention, Washington, D. C., Jan. 22-25.

MISSOURI VALLEY SECTION, American Water Works Association, Omaha, Neb., Nov. 8-10.

NORTH CAROLINA SECTION, American Water Works Association, Elizabeth City, Nov. 12-14.

NEW YORK SECTION, American Water Works Association, New York City, Dec. 27.

Obituary

I. E. VANIER, well known engineer of Montreal, Que., died in that city Oct. 12 at the age of 76.

GARDNER T. SWARTS, for many years head of the Educational Exhibition Co., Providence, R. I., and formerly engineer on several water supply developments in that city, died at Providence, Oct. 20.

NORTON MONTGOMERY, well known to many engineers as the chief counsel for the Moffat Tunnel Commission from 1922 to 1933, died in Denver, Colo., at the age of 62 on Oct. 13.

SIR JOHN AIRD, British engineer well known for his work on the Assuan dam in Egypt, died at his home in London, Oct. 20, age 72. He was a retired major in the Engineer and Railway Staff Corps.

JOHN J. SULLIVAN, assistant engineer in charge of surveys, Memphis Engineers District, U. S. Corps of Engineers, died Oct.

16 at Memphis, Tenn. He was 42 years of age and had been associated with the Engineering Corps for 22 years.

EDWARD C. PRATHER, for 30 years city engineer of Piedmont, Calif., died Oct. 9 at his home in that city at the age of 75. Mr. Prather graduated from the University of California at the age of 19. He served for several years as Alameda county surveyor before becoming city engineer of Piedmont.

COL. HENRY C. JEWETT, U. S. Corps of Engineers, died on Oct. 18 at Manila, P.I. at the age of 55. Colonel Jewett was a native of Buffalo, N. Y., and a graduate of West Point in 1897. He recently completed a four-year assignment as instructor at the Army War College.

KENNETH I. SMALL, manager of the New York office of the Chicago Bridge & Iron Works, was killed Oct. 10 in Portland, Maine, as the result of an accident when he stepped off the railroad platform and was struck by a truck. He was a native of Chicago and had been with the organization since 1898. His special field of activity was the subject of plate girder design and construction.

FRED BUSH CHURCH, retired engineer, died Oct. 15 at his home in Great Neck, L. I. He graduated from Rensselaer Polytechnic Institute in 1891, and after spending several years in the city engineering department of Troy, N. Y., was associated for 25 years with the firm of Westinghouse, Church, Kerr Co.

FRANKLIN M. BOWMAN, vice president of the Blaw-Knox Co., died at his home in Pittsburgh, Pa., at the age of 65. Mr. Bowman was in charge of the transmission tower and structural steel divisions of the company and had been identified with this field of construction for many years. He was a graduate of Toronto University in 1893, and following years of varied work in the engineering field, rose to the position of chief engineer for the Riter-Conley Manufacturing Co. in 1912, resigning to accept a position with the Blaw-Knox Co.

LT. COL. JOHN S. BUTLER, Corps of Engineers, U. S. A., died at the Army and Navy General Hospital, Hot Springs, Ark., Oct. 19. Colonel Butler was born in Rogersville, Tenn., in 1872 and graduated from Vanderbilt University in 1894. He worked for many years as a civilian engineer for the U. S. Engineers on Cumberland and Tennessee River improvement projects. During the World War he served as Lieutenant Colonel, Corps of Engineers, National Army, and was honorably discharged Aug. 28, 1919. He was appointed in the regular army as a Major, Corps of Engineers, July, 1920, and promoted to Lieutenant Colonel September, 1933. His last assignment was as Corps Area Engineer at Omaha, Nebr.

CONSTRUCTION STATISTICS OF THE WEEK

ALTHOUGH state and municipal engineering awards at $17,212,000 are the highest since July 26, federal awards at $2,516,000 and private at $2,897,000 are enough lower to bring the total for the week, $22,625,000, ten per cent below last week.

Increases from last week are registered in waterworks at $1,457,000 and public buildings at $4,209,000, while sewerage at $1,207,000, bridges at $1,340,000 for public awards and $455,000 for private awards, industrial buildings at $1,031,000, commercial buildings at $315,000, highways at $7,699,000, and earthwork, irrigation, drainage and waterways at $1,576,000 are below last week.

The larger awards for the week include John Gaston Memorial Hospital, Memphis, Tenn., $630,000; state highways by New Jersey, $632,000; by Illinois, $947,000; by Kentucky, $982,000; by West Virginia, $597,000 and street paving in Bronx Boro, New York City, $433,000; vehicular bridge over Osage arm of Lake of Ozarks, Camden, Camden Co., Mo., $541,000; earthwork, U. S. Corps of Engineers, Mississippi, $623,000; outdoor auto transformers, Los Angeles, Calif., $952,000; and laying rails in subway and across Delaware River Bridge, for high speed line, Philadelphia, Pa., $737,000.

Both state and municipal bond sales at $9,965,000 and PWA allotments, $968,000 net additions for non-federal and $4,238,000 for federal work, are higher. The state and municipal bond sales total includes $5,000,000 flood control issue bought by Los Angeles County out of its $35,000,000 cash balance following failure to receive bids on this issue from financial houses at the regular offering.

CONTRACTS

(Thousands of Dollars)

	Weekly Oct. 1933	Average Week Prev. 4 Weeks	Oct. 25 1934
Federal Government	$15,604	$ 4,077	$ 2,516
State and municipal	14,065	15,883	17,212
Total public	$29,670	$19,960	$19,728
Total private	5,733	3,660	2,897
Week's total	$35,405	$23,620	$22,625
Cumulative to date: 1933	$818,360	1934	$1,043,029

NEW PRODUCTIVE CAPITAL

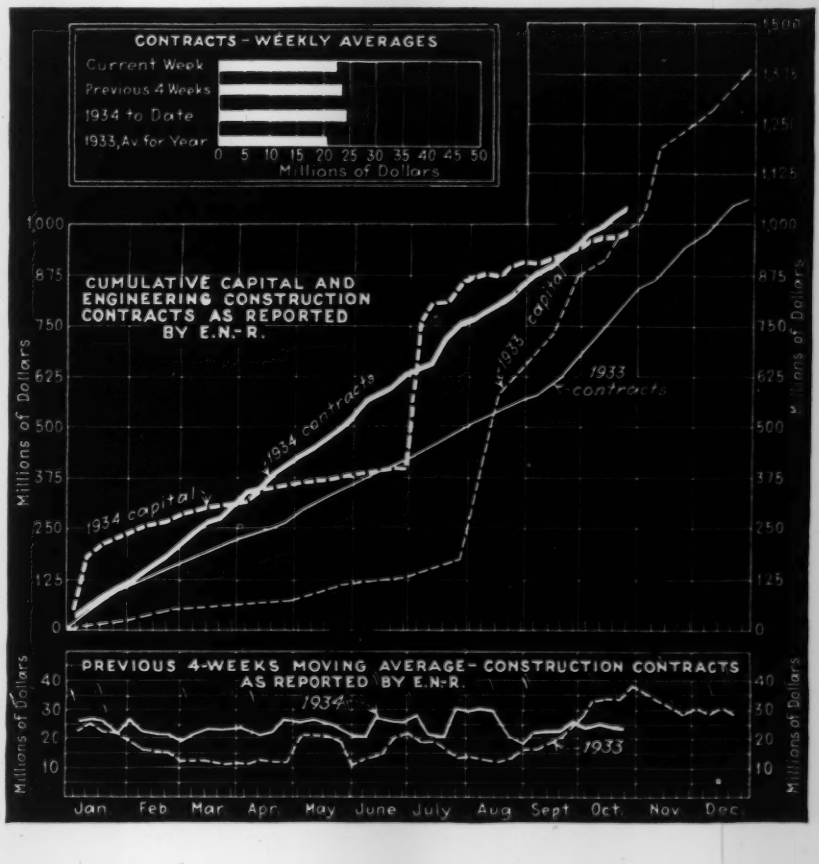
(Thousands of Dollars)

1934	Week Oct. 25	Cumulative
State and municipal	$9,965	$274,374
PWA allotments, S&M	968	606,873
RFC loans, S&M	....	25,463
Corporate issues	....	18,256
PWA allotments, private	....	57,022
Total, Non-Federal	$10,933	$981,988
PWA allotments, Federal Constr.	4,238	193,525
Total new capital	$15,171	$1,175,513
Cumulative to date: 1933	$987,734	1934 $981,988

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Oct., 1934	200.86	96.55	Sept., 1934	101	44
Sept., 1934	200.58	96.41	Aug., 1934	94	42
Oct., 1933	187.74	90.24	Sept., 1933	122	53.5
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5


CONTRACTS - WEEKLY AVERAGES
Current Week
Previous 4 Weeks
1934 to Date
1933, Av. for Year
0 5 10 15 20 25 30 35 40 45 50
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONTRACTS AS REPORTED BY E.N.-R.
1934 contracts
1933 capital
1933 contracts
1934 capital
Millions of Dollars
0 125 250 375 500 625 750 875 1000 1125 1250 1500
PREVIOUS 4-WEEKS MOVING AVERAGE - CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
1934
1933
10 20 30 40
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

Current Construction Unit Prices

Colorado Springs Water Supply Line

CONTRACT was awarded in May, 1934, for 9,532 ft. of 5x7-ft. pipe tunnel to complete the second step in the extensive waterworks improvements at Colorado Springs, Colo. The pipeline, located in the mountains on the slope of Pike's Peak, runs from the South Catamount Reservoir (El. 9160) to Cascades Creek (El. 7314). Construction is of steel pipe of the plain end type with Dresser and Dayton couplings. Pipe is furnished by the city f.o.b. railroad siding. PWA labor rates govern, minimum 62½c. for common, $1.25 for skilled. Completion is scheduled for Jan 1, 1935. Five bids were submitted, with the major variation in the two lowest bids due to quotations on tunnel timbering. Following are unit prices of the three lowest bidders. (A) E. H. Honnen Const. Co., Colorado Springs, $260,621 (contract); (B) Seerie Bros., Denver, $282,334; (C) Schwartz Const. Co., Colorado Springs, $292,476.

COLORADO SPRINGS MOUNTAIN WATER SUPPLY LINE

Item and Quantity (Pipe sizes are O.D., weights are per ft.)	Unit Prices A	B	C
1. Tunnel excavation, 5x7 ft.—9,532 l.f. (av. unit)	$15.32	$17.00	$17.40
2. Tunnel timbering, native—100 M. f.b.m.	40.00	150.00	54.00
3. Tunnel timbering, fir—100 M. f.b.m.	50.00	150.00	90.00
4. Reinforced concrete—533 cu.yd. (av. unit)	27.55	30.08	24.70
5. Reinforced concrete anchors—300 cu.yd.	25.00	39.00	24.00
6. Structural steel—14,000 lb.	.10	.08	.085
7. Field pipe cutting—412 cuts—(av. unit)	1.50	8.00	1.30
8. Backfill trench, and lay 12¾x¼-in. pipe—441 l.f.	2.00	1.25	2.50
9. Backfill trench, and lay 20x ½-in. pipe—805 l.f.	3.30	4.00	3.50
10. Backfill trench, and lay 20x⅜-in. pipe—3,735 l.f.	3.30	6.00	3.50
11. Backfill trench, and lay 20x ¼-in. pipe—417 l.f.	3.30	2.50	3.50
12. Backfill trench, and lay 20x⅜-in. pipe—905 l.f.	2.86	2.07	3.50
13. Backfill trench, and lay 20x ¼-in. pipe—5,915 l.f.	1.80	1.16	2.46
14. Backfill trench, and lay 20x⅜-in. pipe—4,577 l.f.	2.21	1.00	2.10
15. Backfill trench, and lay 20x ¼-in. pipe—6,550 l.f.	2.00	1.11	2.10
16. Backfill trench, and lay 24x ¼-in. pipe—3,320 l.f.	2.14	2.18	2.15
17. Backfill trench, and lay 24x⅜-in. pipe—5,630 l.f.	2.00	1.25	2.50
18. Haul and install 24-in. special pipe—one pce.	5.00	17.00	3.00
19. Haul and install 20-in. special pipe—two pcs.	5.00	60.00	10.00
20. Haul and string 20x ½-in. pipe (141.8 lb.)—805 l.f.	.40	.20	.43
21. Haul and string 20x⅜-in. pipe (129.33 lb.)—3,735 l.f.	.45	.50	.46
22. Haul and string 20x ¼-in. pipe (116.77 lb.)—417 l.f.	.45	.20	.46
23. Haul and string 20x⅜-in. pipe (104.13 lb.)—905 l.f.	.45	.20	.46
24. Haul and string 20x ¼-in. pipe (91.40 lb.)—5,915 lb.	.33	.17	.37
25. Haul and string 20x⅜-in. pipe (78.59 lb.)—4,577 l.f.	.30	.15	.34
26. Haul and string 20x ¼-in. pipe (65.70 lb.)—6,900 l.f.	.30	.19	.35
27. Haul and string 24x ¼-in. pipe (79.05 lb.)—3,620 l.f.	.33	.15	.36
28. Haul and string 24x⅜-in. pipe (125.49 lb.)—5,630 l.f.	.35	.15	.37
29. Haul and string Dresser and Dayton couplings (102 to 225 lb.)—1,876 units	.46	.30	.50
30. Haul and install anchor bolts and plates (lump sum)	5.00	7.50	10.00
31. Haul and install 12-in. needle valve—one	125.00	35.00	75.00
32. Haul and install 12x14-in. taper pipe—one	5.00	30.00	4.00
33. Haul and install 14-in. hyd. gate valve—one	50.00	35.00	25.00
34. Haul and install C.S. 20x14-in. reducer—one	10.00	30.00	5.00
35. Haul and install Venturi tube—one	5.00	30.00	5.00
36. Haul and install 30 deg. C.S. Wye, 20-in—one	30.00	25.00	20.00
37. Haul and install 20x12-in. Tee—one	50.00	25.00	25.00
38. Haul and install 20-in. gate valve—one	50.00	25.00	40.00
39. Haul and field weld 20-in. slip on welding flanges—3	20.00	7.75	40.00
40. Haul 12¾-in. pipe (49.56 lb.)—501 l.f.	1.00	2.00	0.17
41. Cut 12¾x⅜-in. pipe—6 cuts	2.00	5.00	3.00
42. Field cut and weld 12¾x20-in. Tee—3	15.00	20.00	20.00
43. Haul and field weld 12¾-in. slip on welding flanges—6	13.00	5.75	14.17
44. Haul and install 12-in. gate valve—3	30.00	25.00	25.00
45. Haul and install 20-in. gate valve—2	30.00	40.00	25.00
46. Haul and install 24-in. gate valve—2	50.00	45.00	45.00
47. Shop cut and weld 15 deg. 20x24-in. Wye—one	50.00	60.00	75.00
48. Shop cut and weld 15 deg 20x24-in. reducer—one	50.00	50.00	75.00
49. Hauling asphalt paint—400 gal.	.05	.03	.06
50. Painting 20-in. pipe—7,894 l.f.	.04	.08	.045
51. Painting 20-in. couplings, 2 coats—1,436	.10	1.25	.10
52. Painting 24-in. couplings, 2 coats—440	.10	1.25	.12
53. Painting 12¾-in. pipe—501 l.f.	.05	.05	.10
54. Painting Wye and reducer—1 each	1.00	2.50	2.00
55. Clearing right of way—7 acres	100.00	60.00	150.00

Treated Ties, New York Subways

THREE FIRMS submitted remarkably close bids on Oct. 9, 1934, for the furnishing and delivery of quantities of treated timber ties for the New York Independent Subway System for use on the Queens Boulevard line and at Jamaica Yard. All ties are to receive a treatment of creosote. For the main line, specifications call for long leaf yellow pine, three-quarters heart wood. For the yard ties timber specified is dense long leaf yellow pine. Prices do not include laying. Following are complete unit prices submitted by the three bidders: (A) Atlantic Creosoting Co., New York, $112,553; (B) Eppinger & Russell Co., New York, $112,811; (C) Southern Wood Preserving Co., New York, $113,270. Bids were taken by the New York Board of Transportation, Jesse B. Snow, chief engineer.

TIMBER TIES FOR NEW YORK SUBWAYS

Item	Quan.	Price Each A	B	C
Main line ties—6x10-in., treated and undrilled:				
Length: 2 ft. 6 in.	46,968	$1.075	$1.085	$1.05
3 ft. 6 in.	5,140	1.50	1.52	1.55
3 ft. 10½ in.	6,587	1.67	1.70	1.78
4 ft. 10½ in.	10	2.07	2.12	2.23
Main line ties—6x8-in., treated and drilled:				
Length: 8 ft.	1,200	2.62	2.78	2.64
9 ft.	360	2.95	3.13	2.99
Main line ties—6x8-in., treated and undrilled:				
Length: 8 ft.	1,475	2.62	2.78	2.56
8 ft. 6 in.	140	2.72	2.95	2.72
9 ft.	575	2.95	3.13	2.78
9 ft. 6 in.	150	3.11	3.30	3.04
10 ft.	125	3.28	3.48	3.20
10 ft. 6 in.	67	3.44	3.65	3.36
11 ft.	107	3.60	3.82	3.52
11 ft. 6 in.	83	3.77	4.00	3.68
12 ft.	65	3.93	4.17	3.84
12 ft. 6 in.	46	4.10	4.35	4.00
13 ft.	48	4.26	4.52	4.16
13 ft. 6 in.	58	4.42	4.69	4.32
14 ft.	43	4.59	4.87	4.48
14 ft. 6 in.	46	4.75	5.04	4.64
15 ft.	37	4.92	5.22	4.80
15 ft. 6 in.	14	5.08	5.39	4.96
16 ft.	5	5.24	5.56	5.12
16 ft. 6 in.	3	5.41	5.74	5.28
21 ft. 6 in.	26	7.05	7.48	6.88
22 ft. 6 in.	15	7.38	7.83	7.20
23 ft.	18	7.54	8.00	7.36
24 ft.	10	7.87	8.35	7.68
Main line ties—8x8-in., treated and undrilled:				
Length: 9 ft.	88	3.93	4.17	3.84
Yard ties—6x8-in., treated and drilled:				
Length: 8 ft. (type P)	10,550	1.60	1.52	1.53
8 ft. (types R & S)	1,335	1.60	1.52	1.90
9 ft. (types Q & T)	3,905	1.80	1.72	2.16
Yard ties—6x8-in., treated and undrilled:				
Length: 8 ft.	1,090	1.60	1.52	1.50
8 ft. 6 in.	2	1.70	1.62	1.94
9 ft.	35	1.80	1.72	2.05
9 ft. 6 in.	45	1.90	1.81	2.17
10 ft.	66	2.00	1.91	2.28
10 ft. 6 in.	21	2.10	2.00	2.39
11 ft.	54	2.20	2.10	2.51
11 ft. 6 in.	40	2.30	2.19	2.62
12 ft.	2	2.40	2.29	2.74
12 ft. 6 in.	2	2.50	2.39	2.85
13 ft.	13	2.60	2.48	2.96
13 ft. 6 in.	35	2.70	2.57	3.08
14 ft.	9	2.80	2.67	3.19
14 ft. 6 in.	25	2.90	2.77	3.31
15 ft.	11	3.00	2.86	3.42
15 ft. 6 in.	1	3.10	2.96	3.53
16 ft.	4	3.20	3.05	3.65
23 ft.	22	4.60	4.39	5.24
24 ft.	5	4.80	4.58	5.47
Yard ties—8x8-in., treated and undrilled:				
Length: 9 ft.	60	2.40	2.29	2.74
11 ft.	9	2.93	2.80	3.36

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Ark., Fort Smith—City will not take bids until about Jan. 1, new water supply consisting of 6 m.g. filtration plant, dam, concrete reservoir, 23 mi. of 27 in. pipe line, etc. P.W.A. project. W. R. Holway, 302 East 18th St., Tulsa, Okla., engr.

Calif., Galt—Galt Water Dist. will expend $30,000 bond issue to purchase and improve privately-owned water system of Mrs. Rachael Haskins, incl. new fire mains and hydrant installation. Noted May 17.

Idaho, Burley—City requested P.W.A. to rescind its loan and grant of $56,000 for waterworks improvements.

Idaho, Mountain Home—City election Oct. 30, $24,000, replacing watermains with c.i. pipe. P.W.A. project. J. Spofford, Mountain Home, engr. Noted June 21.

Md., Secretary—City making plans and soon takes water supply and distribution system. $21,000. J. R. Cronister, Salisbury, engr.

N. Y., Munnsville—Village soon takes bids waterworks system. $52,000 voted.

N. D., Watford City—Village plans constructing waterworks, incl. distribution system, mains, pumping plant, steel tank, reservoir, etc., $42,000. $28,000 loan and grant allotted by P.W.A. Bugenhagen, Hess & Deeter, Minot, engrs. Noted Dec. 21.

O., Blanchester—City Council, plans approved new 150,000 gal. elevated tank and additional mains. $25,000. P.W.A. project. Jennings-Lawrence Co., 12 North 3rd St., Columbus, engrs. Noted Sept. 7.

O., Canfield—Village plans waterworks, incl. drilling 2 deep wells, erecting standpipe on 1 of 2 sites under consideration and putting in distribution system. P.W.A. authorized $70,000 for waterworks system, incl. outright grant of $17,000 to $18,000, with balance $52,000 to $53,000 to be secured by 2 sets of bonds. The $20,000 issue of general obligation bonds and approximately $33,000 of mortgage revenue bonds. L. T. Fawcett, county sanitary engr, already drew up all plans. Noted Aug. 30.

O., Oak Hill—Village, L. C. Davis, mayor, made plans new waterworks system, 3 pumps, elevated steel tank and distribution lines. $100,000. P.W.A. project. H. K. Bell, 132 McCleland Bldg., Lexington, Ky., engr. Noted Mar. 8.

Okla., Chickasha—City making preliminary plans laying 5,400 lin.ft. 4 and 6 in. water main extensions. $15,000. J. Dubose, engr. Noted Dec. 21.

Ore., Eugene—City soon takes bids extending c.i. water system in college Crest Dist. $16,500. Voted bonds. W. C. Clubb, city engr.

R. I., East Smithfield—Town of Smithfield soon takes bids waterworks in Esmond Village. $145,000. P.W.A. project. R. Adams, Greystone, in charge. W. B. Hall, 1551 North Providence St., engr.

Tenn., Jackson—City, c/o L. Taylor, mayor, voted $175,000 for water and sewer improvements, and extensions under P.W.A., incl. 4 m.g. rein.-con. reservoir to require about 4,500 bbl. cement, 3,300 ft. 15 in., 4,287 ft. 10 in., 6,724 ft. 8 in., and 12,627 ft. 6 in. terra cotta pipe, 81 manholes in sewer extensions; $55,000 for negro high school under P.W.A. and $30,000 for incinerator not under P.W.A. P.W.A. allotments have been made and final plans are in preparation. E. R. Dike, city engr.

Tex., Aransas Pass—City, c/o C. S. Bolton, mayor, voted bonds and soon takes bids waterworks and sanitary sewerage system improvements, $25,000 for watermain extensions, pumping unit, probably tank and tower, and $10,500 for pipe for sewer mains. Est. $38,500. **P.W.A.** L. B. Griffith, 404 Sherman Bldg., Corpus Christi, engrs. Noted Sept. 27.

Tex., Austin—City, c/o J. G. Morgan, mgr., rejected bids Contr. 3, altering boiler room and power plant, main building, cement floors, add 2-room wire cage tool room, all new metal windows, mezzanine floor, rein.-con. base for machinery, sliding doors, turbine room, all new metal windows and steel doors with pilot sliding doors, $10,000; also Contr. 2, filter and headhouse additions to water filtration plant, incl. addition rein.-con. brick to 2nd floor, 2 lime hoppers to head house, rein.-con. and brick, metal doors and windows, etc., foregoing in connection with filtration plant. Will revise plans and new bids asked. P.W.A. project. Noted Sept. 13.

Tex., Pecos—City, B. A. Toliver, mayor, soon takes bids 5 deep wells, 9 mi. c.i. pipe supply mains, 200,000 gal. surface reservoir, distribution c.i. pipe, pump station, pumping equipment. P.W.A. project. B. G. Warner, Pecos, engr. H. R. F. Helland, Frost Bldg., San Antonio, engr. Bonds voted. Noted Aug. 16.

Tex., Poth—City, c/o Wm. Eckel, mayor, plans bond election at once for waterworks improvements, incl. new deep well and casing, 11,000 ft. c.i. mains, fire hydrants, electric pump, $30,000. P.W.A. project. H. H. Ririe, 655 East Woodlawn St., San Antonio, engr. Noted July 26.

Utah, Kanab — City voted bonds to secure P.W.A. loans to construct reservoir and installing pipe in distribution system. $40,000. J. R. Sutherland, Richfield, engr. Noted Oct. 4.

Utah, Monroe—City voted bonds to secure $44,000 loan and grant to replace wood mains with c.i. and enlarging distribution system. $31,000. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs. Noted Aug. 30.

Utah., Payson—City voted $25,000 for c.i. mains, excavating, trenches and laying pipe. Work to be done through FERA with City Watermaster in charge of work. Noted Oct. 4.

Wyo., Pinedale—City voted $30,000, waterworks and sewerage systems. P.W.A. project.

†**Wyo., Yellowstone Natl. Park**—Dpt. Interior, c/o Park Superintendent, plans constructing central water system. $47,400. P.W.A. loan and grant.

Que., Montreal—City Executive bids late in November, three 50 m.g. pumps, $65,000; filter improvements, $90,000; Cote des Neiges reservoir pump, $50,000; addition to Cote des Neges Reservoir, $500,000; new intake at Ville LaSalle, $1,200,000; reservoir at Rosemont, $1,600,000; new Westmount Reservoir, $110,000.

BIDS ASKED

Ark., Decatur — City bids about Nov. 16, waterworks and distribution system, etc. $30,000. P.W.A. loan and grant allotted. E. M. Ratliff, Fayetteville, engr.

Ark., Tyronza—City bids about Nov. 15, waterworks and distribution system. $26,000 allotted by P.W.A. Dickinson & White, Rector Bldg., Little Rock, engrs.

Ill., Knoxville—Nov. 3, by C.A.y, turbine pump for waterworks plant. $4,000. P.W.A. project. Former bids rejected. H. M. Butt, city engr.

Ill., St. Elmo—Oct. 31, by City, G. W. Atwood, mayor, waterworks. $65,200. P.W.A. project. Beard Eng. Co., 44 South Central Ave., St. Louis, Mo., engrs. Noted Dec. 28.

Ind., Union City—Nov. 20, by City, R. Reid, chn. Water Works Comn., improving waterworks, incl. pump house, 3 new wells, stand pipe. $34,000. Noted July 19.

Ia., Storm Lake—City bids about Jan. 1, watermain extensions, hydrants, etc. $15,000. Noted Aug. 2.

La., Ridgeland—Nov. 6, by Mayor, constructing waterworks system, incl. 5,000 gal. galvanized steel tank and creosoted timber tower for support, 30 c.f.m. air compressor with motor, 3,500 ft. 2 in., 485 ft. 3 in. and 1,075 ft. 1 in. galvanized pipe. H. R. Covington, Canton, Miss., engr.

Mich., Detroit—Oct. 30, by C. J. Playens, secy. Bd. Water Comrs., furnishing, placing special coating on interior of two 1,000 hp. boiler drums and tubes and on interior of economizer tubes, and furnishing, installing sheet metal and glass enclosure for power plant piping model at Springwells Station. Part of P.W.A. program. G. H. Fenkell, 735 Randolph St., genl. mgr.

N. H., Hinsdale—Oct. 31, by A. Krumenaker, Town Hall, constructing reservoir at Kilburn Pond. To exceed $15,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., engrs. Noted Oct. 11.

N. J., Chester—Nov. 5, by Boro, well and pump. No bids received Oct. 8. G. W. Knight, 38 Park Pl., Newark, engr. Noted Oct. 4.

N. Y., Ossining—See "Sewerage and Waste Disposal."

N. C., Murfreesboro—Nov. 2, by E. S. Britt, mayor and Bd. Comrs., constructing water distribution system, incl. 17,000 ft. 6 and 8 in. c.i. distribution system, 75,000 gal. elevated tank, 200 meters for domestic services. $58,000. Spoon & Lewis, Greensboro, engrs.

O., Canal Winchester—See "Contracts Awarded."

S. C., Central—Oct. 30, by City, water supply and distribution system. To exceed $60,000. P.W.A. project. Harwood Beebe Co., Spartanburg, engrs. Noted Jan. 25.

Tex., Elkhart—Nov. 5, by City Secretary, water and sanitary sewerage system, incl. deep well and pumping equipment. Separate proposal for drilling of deep well and furnishing pumping equipment. $32,000. J. S. Rady, 400 Majestic Bldg., Fort Worth, engr. Noted July 26.

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

◆

CONTRACTS AWARDED

Ariz., Williams—City, constructing reservoir dam, pipe line from reservoir to city distribution system, filter unit, chlorinator unit and additions to present distribution system, to O. F. Fisher, Phoenix, $116,983. **P.W.A.** Bids Sept. 17.

Ark., Junction City—J. M. Covey, mayor, furnishing, installing meters and meter boxes, only, to Union Hardware & Furniture Co., Inc., Junction City, $1,497. **P.W.A.** Bids Oct. 12.

Ark., Kensett—Recorder of Incorporated Town of Kensett, tentatively awarded contract for complete waterworks system, to R. J. Lynch & Co., Rector Bldg., Little Rock, and D. F. Jones Constr. Co., Pyramid Life Bldg., Little Rock, $37,624. **P.W.A.** Bids Oct. 16, awarded Oct. 17.

Calif., Long Beach—Water Dpt., furnishing, installing 1 deep well turbine pump in North Long Beach Well 4, Jackson St., and 1 deep well turbine pump in Commission Well 3, Carson St., to Wintroath Pump Ltd., 1100 South Meridian St., Alhambra, $4,388 and $1,609 respectively. Bids Sept. 24.

Calif., San Bernardino—E. Q. Sullivan, dist. engr, State Hy. Comn., drilling 125 ft. water supply well at Cronese Maintenance Station site, to D. A. Beck & Sons, Alta Loma, $1,095. Bids Sept. 17.

Calif., San Jose—Santa Clara Valley Water Conservation Dist., constructing Vasona Dam and Canal, involving earth fill dam with concrete spillway section across Los Gatos Creek to create percolating reservoir and conduit, consisting of canal in earth and pipe from dam to San Tomas Aquinas Creek, 2¼ mi. long and all appurtenant works, to C. N. Swenson Co., 355 Stockton Ave., $101,945. Est. $119,847. **P.W.A.** Bids Oct. 2, awarded Oct. 8.

Calif., Taft—City extensions to fire mains and installing additional hydrants, by SERA labor. To exceed $15,000. Plans purchasing materials for same. O. Boyd, city engr. Noted Feb. 15.

Colo., Pueblo—Comrs. Waterworks No. 2, A. H. Wagner, 119 East Abriendo Ave., relining settling reservoirs with concrete, to Driscoll Constr. Co., 220 South Main St., $9,525.

D. C., Wash.—Architect of Capitol, removing existing watermain and installing new steel watermains, to H. L. Harrison & Son, 1060 Broad St., Newark, N. J., $38,866.

Ga., Cornelia—City, c/o H. K. Cleveland, mayor, constructing addition to present waterworks system, incl. tanks, reservoir, etc., rein.-con. coagulating basin, 63x29x6 ft. pump and engine room, brick walls, 1 story, basement, 39x40 ft., rein.-con. clear well, 60 ft. diam., 1 elevated tank, 200,000 gal. capacity on 81 ft. steel tower, Unit 1, pipe lines, to J. B. McCrary & Co., 22 Marietta St. bl., Atlanta, $27,772•••Unit 2, building and Unit 3, filter equipment, to Smith Hendrix Co., Barnett Bldg., Jacksonville, Fla., $24,878 and $9,450 respectively•••Unit 4, pump, to Worthington Pump Co., Mortgage Guarantee Bldg., Atlanta, $2,846 •••Unit 5, standpipe, to Steel Constr. Co., Atlanta, $6,475. Grand total $71,421. **P.W.A.** Awards made awaiting money from P.W.A.

Ill., Bethany—City Council, well, pumps, pump house, distribution mains, fire hydrants, valves, elevated steel tank, to C. M. Porter Co., 1957 Conway Bldg., 111 West Washington St., Chicago, $41,536. **P.W.A.** Bids Sept. 7. Noted Aug. 16.

Ill., Heyworth—Village, Village Hall, waterworks and distribution system, to A. F. Krall

†*Federal Government.*

FEDERAL PROJECTS NUMBER

ENGINEERING NEWS-RECORD

Nov. 29, 1934

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Waterworks (Continued)

& Co., 977 West Wood St., Decatur, $50,379. Est. $68,000. **P.W.A.** Bids Sept. 20. Noted Sept. 6.

Md., Baltimore—Bd. Awards, elevated water tank at Baltimore City Hospital, to Chicago Bridge & Iron Co., 37 West Van Buren St., Chicago, Ill., $14,800; pumping equipment, to Dravo Doyle Co., Broad St. Sta., Phila., Pa., $13,850. Bids Oct. 3. Noted Sept. 20.

Massachusetts—Salem and Beverly Water Supply Bd., City Hall, Salem, furnishing portland cement in connection with waterworks construction, to J. P. Langmaid & Sons, 311 Derby St., Salem***sand, to Essex Sand & Gravel Co., Pine St., Peabody***cement and copper sheeting, to Waters & Brown, 57 Washington St., Salem***manhole steps, to Leonard Iron Fdry. Co., Tulip St., Salem***wall castings and sleeves, to Builders Iron Fdry. Co., 9 Codding St., Providence, R. I.***reinforcing steel, to Northern Steel Co., 44 School St., Boston***filter box fittings, to F. A. Houdlette & Son, Inc., 88 Tremont St., Boston. Noted Sept. 27.

Minn., Byron—Village, 6 and 8 in. c.i. mains, to W. C. Fraser & Son, 1957 University Ave., St. Paul, $10,814***tower and tank, to Minneapolis-Moline Power Implement Co., 2844 Minnehaha Ave., Minneapolis, $6,479***well, to E. Nelson, Rochester. **P.W.A.** Bids Oct. 5. Noted Sept. 27.

Minn., Ely—City, remodeling pump and treatment plant, to Ray Englund, Eveleth, and Lenci & Lenci, Virginia, $69,775. **P.W.A.** Bids Oct. 9. Noted Sept. 27.

Minn., Lonsdale—Village, furnishing, installing 1,398 lin.ft. 6 in. c.i. pipe, 4 hydrants, 1 gate valve, to F. J. Factor, Lonsdale, $2,640. Bids Sept. 20.

†Nev., Tonopah—Bureau Biological Survey, Wash., D. C., drilling 5-8 wells within Federal Migratory Bird Refuge at Rainbow Valley in Nye Co., to R. L. Norris, 3975 8th Ave., Sacramento, Calif., $25,000.

†N. M., Fort Sumner—City drilling well, pumping equipment and c.i. distribution system, to Hayner & Burns, Las Cruces; elevated tank, to Chicago Bridge & Iron Wks., 37 Van Buren St., Chicago, Ill. Est., $58,000. **P.W.A.** New Mexico Eng. Co., Albuquerque, engrs.

N. Y., Kings Park — Dpt. Mental Hygiene, State Office Bldg., Albany, water wells, at Kings Park Hospital, to Artesian Well & Supply Co., c/o N. F. Harris, Syosset, $21,740. Bids Sept. 26.

N. C., Rocky Mount—Town, waterworks improvements, water lines and filtration plant, to Fiske-Carter Constr. Co., Spartanburg, S. C., $159,828. Est. $100,000. **P.W.A.** Bids Aug. 16.

N. C., Richlands—Town, waterworks improvements, to Goode Constr. Co., Charlotte. Est. $31,000. **P.W.A.** Bids Sept. 28. Noted Sept. 20.

O., Athens—A. Gross, dir. Serv., Contr. B, waterworks, to H. E. Miller, 938 South High St., Columbus, $8,550; Contr. A, pump and pump house, 3 pumps, to W. E. Wood Co., 2714 Union Guaranty Bldg., Detroit, Mich., $44,000. **P.W.A.**

O., Canal Winchester—Village, softening plant, Zeolite system, force account. Est. about $15,000. **P.W.A.** C. T. Kaiser, 656 West Main St., Newark, engr. Noted Sept. 7.

Okla., Hinton—Mayor, waterworks extensions and improvements, etc., to E. W. Baker & Co., 247 Southwest 21st St., Oklahoma City, $18,723. Bids Oct. 5. **P.W.A.** Noted Oct. 4.

Pa., Oil City—City, B. B. Webber, city engr., City Hall, installing new water mains in various parts of city, and Hasson Heights Dist., day labor, work relief project, $15,000. City Council authorized expenditure of $7,572 for purchase of pipe and soon takes bids for same. Noted Oct. 4, under "Materials and Equipment."

Pa., Pittsburgh—City, relaying pipe for Bureau of Water on Smallman and 21st Sts., to R. D. Thomas Co., Jenkins Arcade, $42,927. C. M. Reppert, City County Bldg., engr.

S. C., Bethune—City, installing complete waterworks system, distribution system, incl. pipe lines, meters, tank found., etc., to R. Lee, Monckton, Md., $13,559***1 deep well, 1 deep well pump and 1 building, to J. R. Connelly, Florence, $6,524***75,000 gal. elevated tank on 100 ft. tower, to R. D. Cole, 57 East Broad St., Newman, Ga., $5,644. Grand total $25,727. **P.W.A.** Bids Sept. 26. Noted Sept. 20.

S. C., Blackville—City, wells and pumps for waterworks, to J. R. Connelly, Florence, $6,625. **P.W.A.** Bids Oct. 2. Noted Sept. 27.

S. C., Pinewood—Town Council, complete waterworks system, concrete pipe lines, valves, hydrants, meters, to Boyce Co., Clearwater, Fla., $10,328***1 deep well, 1 deep well pump and 1 building, to Virginia Mchy. & Well Co., Richmond, Va., $5,530***175,000 gal. elevated tank on 100 ft. tower, to R. D. Cole, 57 East Broad St., Newman, Ga., $5,738. Grand total $21,596. **P.W.A.** Bids Sept. 25. Noted Sept. 20.

Tex., Austin—City, c/o J. G. Morgan, mgr., constructing Contr. 1, settling basin, using corrugated iron pipe, to E. B. Snead, Enfield Gracy Bldg., $81,802. Est. $85,000. **P.W.A.** Bids Sept. 13.

Tex., Fredericksburg—City, c/o B. Habenicht, clk., E. Krauskopf, mayor, constructing waterworks system, incl. gravel wall wells, pumping equipment, 7,000 ft. 2- to 10-in. c.i. pipe, 60,000 lin.ft. pipe trenching 2 to 6 ft. deep, 80 manholes, 2,000 cu.yd. rock excav., to Sherman Machine & Iron Wks., 18 East Main St., Oklahoma City, Okla., $38,000. **P.W.A.** Awarded Oct. 11.

Tex., Marshall—City, c/o H. J. Graeser, engr., reservoir improvements, to Forcum-James Co., 843 Vance Ave., Memphis, Tenn., $24,092. **P.W.A.** Bids Oct. 9. Noted Sept. 27.

†Utah—See "Earthwork, Irrigation, Drainage, Waterways."

Wis., Abbotsford—Village, reducers, projections, gates, valves, valve boxes, to W. H. Hobbs Supply Co., Eau Claire***hydrants, to South Park Hydrant & Pump Co., 820 North Concord St., South St. Paul, Minn.***painting water tower, to Johnson & Hessel, Abbotsford, $400. Bids Oct. 2.

Wis., Racine—Commissioner P. Wks., constructing breakwater and effluent outlet line, to Edward E. Gullen Co., 626 East Wisconsin Ave., Milwaukee, $151,827. **P.W.A.** Bids Sept. 20.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Ark., Carlisle—City preparing plans and specifications complete sewerage system. H. R. Carter, 408-409 Natl. Standard Bldg., Little Rock, engrs. P.W.A. allotted $33,000 grant and loan.

Ark., Fort Smith—City, probably will not take bids until January, for intercepting sewer in J St., to discharge flow of North J St. sewer into river at point large trunk sewer is now discharged, being 3,000 ft. north of the mouth of the North J St. sewer, requiring 3,020 ft. 27 in. vitr. clay pipe. Necessary to test bond issue. P.W.A. allotted $35,000. W. L. Winters, Merchants Natl. Bldg., engr. Noted Aug. 2.

Neb., Stuart—City rejected bids Oct. 7, sanitary sewerage system and disposal plant, Sect. A, sewer pipe, iron pipe, bulkhead, Sect. B and disposal plant, Sect. C, sewerage pumping plant, $48,000. Will readvertise. Henningson Eng. Co., Union State Bank Bldg., Omaha, engrs.

N. Y., Greenburgh—Greenburgh Twp. Water & Sewer Dpt., Lyceum Bldg., Tarrytown, organizing sewer district for construction sewerage system, $226,000. P.W.A. funds allotted. J. N. Heeney, 161 Main St., White Plains, engr. (**Correction** address for owner.) Noted Oct. 11.

N. Y., Woodridge—Bd. Trustees rejected bids Oct. 10, sewers and treatment works. Noted Sept. 20.

O., Willard—City Council passed legislation providing for a vote at November election for $75,000 bond issue for new sewerage system, approved by P.W.A. $187,000.

Pa., Williamsport—City plans new storm sewers, removal of trolley tracks from city streets and improvement of municipal tennis courts, $50,000 or more. L. Mussina, city engr.

Tenn., Jackson—See "Waterworks."

Va., Falls Church—Town Council plans sewerage system, $177,000. P.W.A. project. J. B. McCrary Co., Inc., 22 Marietta St., Atlanta, Ga., engrs. (**Correction**—Engineers). Noted Oct. 11.

Wash., Seattle—Plans for sanitary survey of Seattle and King Co., a project for which $132,123 has been asked of Washington Emergency Relief Administration by E. F. Chase, sanitary engr. for city of Seattle has apparently approved.

Ont., Stratford—City Council plans relief unemployment program for winter, new sewers and concrete pavements, $200,000. A. Riehl, city engr. will prepare report.

Ont., Toronto—City soon takes bids extending sewers as part of city relief works program. $200,000.

BIDS ASKED

Ark., West Memphis—City, c/o W. H. Hundhausen, mayor, bids about Dec. 5, 7 mi. mostly 8 in. and some 10 and 12 in. sewer pipe, 7,000 to 8,000 ft. 6 in. c.i. pipe, two 3 in. automatic submerged sewage pumps, 30 manhole covers, 10 flushing siphons, etc. $62,000. P.W.A. allotted $62,000. M. C. Baumann, West Memphis, engr.

Conn., Hartford—Nov. 15, by Bd. Contr. & Supply, for Contr. 8, Metropolitan Sewerage Project, administration building, gate houses, screen and grit chambers and house, conduits, roads and walk at disposal plant. R. N. Clark, city engr. Noted June 19.

Ill., Edwardsville—Nov. 7, by City, sewage treatment plant, auxiliary piping, $75,000; 6- to 27-in. vitr. clay or concrete sewers, and 10- to 24-in. c.i. intercepting sewers and appurtenances, $105,000. P.W.A. project. W. H. Morgan, city engr. Sheppard, Morgan & Schwaab, Faulstich Bldg., Alton, engrs. Noted Oct. 4.

Ind., Goshen—Nov. 2, by City, C. E. Firestone, mayor, sewage disposal plant, $455,000. P.W.A. project. W. Shaffer, Goshen, clk. Noted Sept. 6.

Ind., Whiting—See "Contracts Awarded."

†Md., Annapolis—Nov. 7, by Yards & Docks, Navy Dpt., Wash., D. C., sewers, drains, motor-driven pumps, at Naval Academy, Spec. 7517.

Mass., Boston—Oct. 29, by City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex, concrete or vitr. clay sewer lines, in Cottage St. between Porter and Maverick St. in East Boston. To exceed $25,000. P.W.A. project.

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†Federal Government.

Sewerage, etc. (Continued)

Mass., Boston—Oct. 30, by City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex. Hyde Park Ave. Outlet Sewer between Neponset River and Hyde Park Ave. on land owned by New York, New Haven & Hartford R.R. in Hyde Park. To exceed $30,000. P.W.A. project.

Mass., Somerville—Oct. 29, by City, J. E. Mullaney, engr., City Hall, concrete or vitr. clay sewer lines in Wheatland St., Contr. 1, and Garfield Ave., Willow Ave., Kidder Ave., and Perry St., Contr. 2. $50,000 loan and grant. P.W.A. project. Noted July 26.

N. Y., Ossining—Oct. 30, by Dpt. Correction, State Office Bldg., Albany, constructing sewers and waterlines at Sing Sing Prison, for library and school buildings.

Tex., Stanton—Nov. 6, by City, c/o C. Ebersol, mayor, sanitary sewerage system, incl. vitr. tile pipe, trenching, manhole drops, drilling well and equipment. $34,000. P.W.A. project. Montgomery & Ward, Harvey-Snider Bldg., Wichita Falls, engrs. Noted Sept. 27.

Va., Clarendon—Oct. 29, by Arlington Co. Bd., laying 18,600 lin.ft. 18- to 42-in. sanitary sewers, Contr. 8-A; and 7,700 ft. 27- and 30-in. sanitary sewers, Contr. 8-B. P.W.A. project. J. N. Chester Engineers, 200 Lee Hy., Clarendon, engrs.

Wis., Minocqua—Nov. 2, by Town Bd. Clerk, storm water and sanitary sewerage system, sewage treatment plant, incl. rectangular primary and secondary settling tanks, circular trickling filter bed, circular sludge digestion tank, sludge drying bed with glass covered superstructure, control buildings, etc. P.W.A. project. G. W. Huber, chn. Bd. Supervs. Suhr, Berryman, Peterson & Suhr, 130 North Wells St., Chicago, Ill., engrs. Noted Aug. 9.

CONTRACTS AWARDED

Ala., Talladega—City, 6,000 ft. sanitary sewers to Dimiljean Co., Birmingham. **P.W.A.** Noted July 12.

Ind., Washington—City, T. C. Metcalfe, clk., 3,974 ft. sanitary sewers, to Independent Concrete Pipe Co., 201 North West St., Indianapolis, $35,766. **P.W.A.** Noted May 10.

Ind., Whiting—Standard Oil Co. of Indiana, 137 West 11th St., Indianapolis, constructing sewage separator 250 ft. long, 100 ft. wide, for refining plant, own forces. $700,000.

Md., Baltimore—Bd. Awards, for Storm Water Contr. 181, to D. C. McAller, Harford Ave. and Baltimore & Ohio R.R., $33,288. Bids Sept. 26. Noted Sept. 20.

Mich., Bessemer—City sewage treatment plant, General Contr. A. to Barrett & Record Co., Flour Exchange, Minneapolis, Minn., $80,055 •••Contr. B, Item 1, to Lakeside Eng. Corp., 176 West Adams St., Chicago, Ill., $2,470•••, Item 2, to Chain Belt Corp., 20 North Wacker Dr., Chicago, Ill., $3,856•••Item 3, to Dorr & Co., 221 North La Salle St., Chicago, Ill., $2,027. Grand total $89,008.

New York—Dpt. Sanitation, Municipal Bldg., New York, alterations and additions to Bergen Landing and Betts Ave. Destructor Plants, Queens Boro, to Wilcox Constr. Co., 25-20 41st Ave., Long Island City, $115,842 and $70,485 respectively. Bids Sept. 25. Noted Sept. 13.

N. Y., Brentwood—Dpt. Mental Hygiene, State Office Bldg., sewers and waterlines at Pilgrim State Hospital, to Kenlon Constr. Co., 401 West 59th St., New York, $24,173. Bids Sept. 26. Noted Sept. 13.

N. Y., Newark—Dpt. Mental Hygiene, State Office Bldg., Albany, sewer and waterlines at Newark State School, to Sanaceno & Mauro, 808 Jefferson Ave., Utica, $26,874. Bids Sept. 26. Noted Sept. 27.

O., Columbus—W. J. Lucks, dir. Service, relief sanitary and storm sewers, Contr. 22, Cleveland Ave. and Westerville Rd., involving 5,490 ft. 30- to 48-in. rein.-con. pipe, 12,700 cu.yd. 15 ft. earth trenching, 1,650 sq.yd. asphalt repaving, 4,800 ft. 8 in. vitr. clay sewer pipe subdrains, to A. F. Riley, 408 Thurman Ave., $57,474. **P.W.A.** Bids Sept. 27.

O., Columbus—W. J. Lucks, dir. Service, relief sanitary and storm sewers, Contr. 12, Sect. 5, main line in Whitethorne Ave., involving 2,800 ft. 42 in. rein.-con. pipe, 18,000 cu.yd. earth trenching, 800 cu.yd. concrete, 2,450 ft. 8 in. c.p. sub-drain, to Dominic Nero Co., 1424 Lakeview Rd., Cleveland, $58,812. **P.W.A.** Bids Sept. 25.

O., Columbus—W. J. Lucks, dir. Service, 13,280 ft. 8- to 18-in. vitr. clay sanitary sewers Contr. No. 15, to Curro & Whittaker Co., P. O. Box 96, South Euclid. $39,366. **P.W.A.** P. W. Maetzel, City Hall, engr.

O., Columbus—W. J. Lucks, dir. Service, constructing Beulah Rd. Sect. Sanitary Sewers in alley between Weber Rd. and Oakland Park Ave., involving 16,750 ft. 6 and 8 in. pipe, to H. E. Miller, 938 South High St., $29,400. **P.W.A.** Bids Oct. 4.

Pa., Harmarville—Gulf Refining Co., 7th and Grant Sts., Pittsburgh, sewage disposal plant at owner's research laboratories, to H. E. Dobson, 145 Westland Dr., Pittsburgh. H. H. Henderson, Gulf Bldg., Pittsburgh, engr.

Tex., Fredericksburg—City, c/o B. Habenicht, secy., sewage disposal plant, 67,000 ft. 4- to 12-in. vitr. tile or concrete pipe, activated sludge or contractors proposal, to Sherman Machine & Iron Wks., 18 East Main St., Oklahoma City, Okla., $143,000. **P.W.A.** Bids Oct. 11. Noted Sept. 27.

Tex., Houston—City, c/o O. F. Holcombe, mayor, storm sewers, incl. laterals and stubs, to Russ Mitchell, Inc., 2701 Texas Ave., $259,342. **P.W.A.** Noted Oct. 4.

Tex., Marshall—City, c/o H. J. Graeser, mgr., sewage disposal plant, to Froemming Bros., c/o Geo. Kies, 3901 Miramar St., Dallas, $87,377; outfall and water lines, to Forcum-James Co., 843 Vance Ave., Memphis, Tenn., $40,116. Est. $140,000. **P.W.A.** Bids Oct. 9. Noted Sept. 27.

Wis., Elkhorn—City, laying 12,000 ft. 12 and 15 in. sewer pipe, to W. O'Neil, Lake Geneva, at 18.5c. per ft.•••concrete blocks for manholes, to Home Lumber & Fuel Co., Elkhorn, $259••• 5,000 ft. 12 in. and 4,000 ft. 15 in. drain tile, to Illinois-Wisconsin Concrete Pipe & Tile Co., Beloit, 23c. and 38c. per ft. respectively•••1,600 ft. 15 in. concrete drain tile and 1,400 ft. 15 in. concrete sewer pipe, to Waukesha Cement Tile Co., Waukesha, 38c. and 62c. respectively.

Wis., Milwaukee—Sewerage Comn., constructing foundations for blowers for sewage plant extensions, to Hersh Constr. Co., 808 North 3rd St., $4,573. **P.W.A.** Bids Oct. 4, awarded Oct. 18. Noted Sept. 27.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., Los Angeles—City made plans new subway, Macy St., from Avila to Date Sts., in connection with proposed Los Angeles Union Railway Terminal, incl. 34 Sofit subway lights, 40 ornamental bracket lights. To exceed $150,000. P.W.A. project. R. W. Stewart, City Hall, bridge engr.

Indiana—State Hy. Comn., Indianapolis, plans constructing viaduct from Forsythe Ave. and Road 41 from East Chicago city limits to Hammond. $1,250,000.

Louisiana—State Hy. Comn., Baton Rouge, making plans 2,050 ft. overpass 1,217 ft. approaches, 41 ft. wide across tracks of Texas & Pacific R.R. at Livonia, Point Coupee Parish.

Mass., Yarmouth—Town Bd. Selectmen, Town Hall, plans new bridge over Mill River, West Yarmouth, as authorized by War Dpt. $25,000 or more.

Neb., Florence (Sta. Omaha)—Bd. Trustees Florence Bridge, Omaha, plans 2,000 ft. bridge. Seeking Federal approval. U. S. Engineers will hold public hearing on Oct. 17. H. H. Henningson, Union State Bank Bldg., Omaha, engr.

†Neb., Valentine—Federal Game Refuge Reservation rejected bids constructing bridge near here. Will readvertise probably next spring.

N. Y., Brooklyn—Dpt. Plant & Structures, Municipal Bldg., New York, soon takes bids bascule bridge over Wallabout Canal, at Washington Ave. $469,000. L. C. L. Smith, c/o owner, engr.

N. Y., Jamestown—Erie R.R. Co., G. S. Fanning, ch. engr., Midland Bldg., Cleveland, O., bids early in December, eliminating main line crossing at Fairmount Ave. $200,000-$300,000. Noted Aug. 23.

N. Y., Jamestown—New York State and Chautauqua Co. plans steel, concrete highway bridge, near Stillwater, Route 60, in connection with relocation of that highway. $25,000. C. R. Waters, Buffalo, dist. engr. Dpt. P. Wks. E. Fitch, Falconer, co. engr.

N. Y., Syracuse—Onondaga Co., Court House, plans reconstructing 45 bridges in various townships. R. B. Traver, 401 Montgomery St., Co. supt. hys.

N. Y., Syracuse—New York Central R.R. Co., W. J. Pfau, ch. engr., 466 Lexington Ave., New York, plans relocating main line Thompson Rd. to Syracuse Junction in connection with eliminating grade crossings. Pub. Serv. Comn. approved revised estimated cost in amount of $11,229,000 for same.

O., Cleveland—City completing plans 1,790 lin.ft. rein.-con. culvert in Nine Mile Creek. $115,000. P.W.A. granted $34,000 loan. R. Hoffmann, 518 City Hall, engr.

Texas—State Hy. Comn., J. Wood, chn., Austin,, plans rein.-con. bridge over Mustang Creek, Hy. 37, S.P. 882-D, Clarksville, Red River Co. J. E. Pirie, Paris, div. engr.

Texas—State Hy. Comn., J. W. Wood, chn., Austin, making plans concrete bridge over Brazos River, near San Felipe, Hy. 73, Austin Co., made plans steel, concrete bridge over Lampasas River, 3 mi. south of Belton, Hy. 2, Bell Co.; bridge over Neches River, relief bridges and approaches, on Hy. 94, 9.2 mi. west of Lufkin, Angelina Co.; bridge over Neches River, relief bridges and approaches, 3.2 mi. west of Angelina Co. line, Hy. 94, Trinity Co. G. G. Wickline, Austin, bridge engr.

BIDS ASKED

Calif., San Francisco—See "Unclassified."

Illinois—See "Streets and Roads."

Louisiana—Nov. 14, by State Hy. Comn., Baton Rouge, completion of Red River Bridge at Alexandria, Rapides Parish, Project 4905, incl. construction of overpass and concrete girders and remaining bents for approaches to river; completion of Ouachita River Bridge at

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†*Federal Government.*

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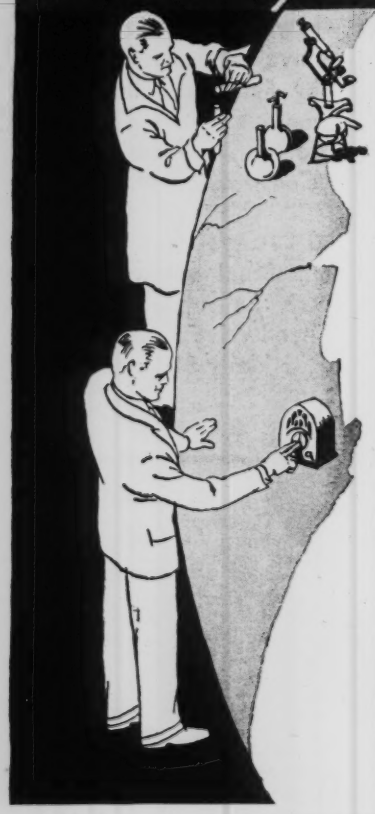

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Bridges, etc. (Continued)

Monroe, Ouachita Parish, Project 4606, incl. constructing roadway approaches and concrete deck girder spans and bents. Contracts for above were let but work was stopped by inability of Commission to meet its cash obligations to contractors in 1931.

Minnesota—Nov. 2, by State Hy. Dpt., St. Paul, constructing Bridge 5296, State Project 14-7-21-2, NRH 216-E, near Eagle Lake, Blue Earth Co.; Bridge 5396, S.P. 210-2-36-1, NRH 142-A, near Motley, between Cass and Morris Counties.

New York—See "Streets and Roads."

Ohio—Nov. 2, by O. W. Merrell, dir. Hys., Columbus, (under state funds), bituminous macadam, constructing rein.-con. slab bridge and spillway and concrete dam at Pee Pee Creek, south of Waverly and an artificial lake, 1.174 mi. Sect. "A" (part) Waverly-Coopersville Rd., Pike Co. $188,116.

Pennsylvania—Nov. 2, at office S. S. Lewis, secy. Hys., Harrisburg, 2,363 ft. through-truss and plate girder bridge, R-69 and 203, Sect. 9, Leechburg and West Leechburg Boroughs, Allegheny Twp., Armstrong and Westmoreland Counties, involving 36,258 cu.yd. Class 1 and 6,590 cu.yd. Class 2 excav.; alterations and additions to south span and south approach of 188 ft. viaduct, R-72, Butler City, Butler Co., 80 cu.yd. Class 2 excav.; 4,600 ft. rein.-con. bridge, R-170, Sect. 9, Ashley Borough, Hanover Twp., Luzerne Co., 40,816 cu.yd. Class 1 and 588 cu.yd. Class 2 excav.; 9,366 ft. rein.-con. bridge R-88, Sect. 5, Wayne Twp., Erie Co., grading for approach, involving 3,028 cu.yd. Class 1, 350 cu.yd. Class 2 and 10,460 cu.yd. borrow excav.

Tex., Wharton—Oct. 31, by Wharton Co., c/o J. Norris, judge, 12 bridges, rein.-con., steel trusses, timber piling, $118,000. P.W.A. project. J. G. Turney, Wharton, engr. Noted July 25.

CONTRACTS AWARDED

Colo., Pueblo—Missouri Pacific R. R. Co., 13th St., St. Louis, 385 ft. concrete, steel bridge over Cramer Creek, Nepesta, 29 mi. east of here, to List-Weatherly Co., Kansas City, Mo. Est. $28,000.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, rein.-con. substructure and 4 paved approaches for bridge and superstructure for same on Route 3, at Prophetstown, Whiteside Co., to Clinton Eng. Co., Clinton, Ia., $38,838 and $26,191 respectively. **P.W.A.** Bids Oct. 4. Noted Sept. 27.

Illinois—Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, 3 bridges in Ogle Co., to Oltendorff Constr. Co., Elgin, $32,139***bridge in LaSalle Co., to Cephis Williams Constr. Co., Streator, $12,861***bridge in Monroe Co., to Watt Constr. Co., Winchester, $9,382***all foregoing not P.W.A. projects***substructure viaduct in Henderson Co., to A. P. Munson, Marion, $21,863*** superstructure same bridge, to Ben Hur Constr. Co., Springfield, $27,347, both **P.W.A.** Grand total $103,592. Bids Aug. 28 and Oct. 4. Noted Sept. 27.

Iowa—State Hy. Comn., Ames, bridge in Cass Co., to F. O. Akin, Corning, $15,548***Humboldt and Wright Counties, to Snyder & Johnson, Humboldt, $6,167***Jefferson Co., to A. Olson, Waterloo, $6,601***O'Brien and Osceola Counties, to Guyer Constr. Co., Sheldon, $7,351*** Webster Co.; to C. E. Larson Constr. Co., Fort Dodge, $13,820***Wright Co., to Hildebrand & Kragh, Belmond, $7,382. Grand total $56,869. **P.W.A.** Bids Oct. 9, awarded Oct. 16. Noted Oct. 4.

Mo., Camden—Camden Co., constructing substructure for vehicular bridge over Osage Arm of Lake of Ozarks, on State Route 5, approximately 30 mi. south of Versailles, to W. A. Ross Constr. Co., 25th and Summit Sts., Kansas City, $211,187***superstructure, to Stupp Bros. Bridge & Iron Co., 380 Weber Rd., St. Louis, $329,930. **P.W.A.** Bids Oct. 16. Noted Oct. 11.

Nebraska—Platte Valley P. & I. Dist., North Platte, 2 new bridges, one at Brule and other at Roscoe, to Koehler Constr. Co., Lincoln, $44,797 and $88,801 respectively. **P.W.A.**

Nebraska — See "Earthwork, Irrigation, Drainage and Waterways."

New Hampshire—State, Hy. Dpt., Concord, 1 span, rein.-con. bridge, Pittsfield, to Eastern States Bridge Co., Concord, $22,651. Bids Oct. 2, awarded Oct. 15. F. E. Everett, comr. of Hy. Dpt. and ch. engr.

New York—Triborough Bridge Authority, 111 8th Ave., New York, constructing Ward's Island Piers of Triborough Bridge connecting Manhattan, Bronx and Queens Boros, Contr. 26, to Woodcrest Constr. Co., Grand Central Terminal, New York, $369,860; grading Whitlock Ave., Bronx Connection of bridge, to A. E. LaMura, 68 East Fordham Rd., $11,744. **P.W.A.** Bids Oct. 4. Noted Sept. 27.

Ohio—See "Streets and Roads."

O., Dayton—City Manager, repairing Washington St. Bridge, incl. removal of old roadway fill, repairing concrete arches, walls and piers, new paving, new handrail, waterproofing, driving sheet piling around pier footings, etc., to Price Bros. Co., 1932 East Monument Ave., $66,828. Est. $68,870. **P.W.A.** Bids Oct. 9.

Oregon—State Hy. Comn., Portland, rein.-con. arch bridge in Baker Co., to J. A. Terteling, Boise, Idaho, $13,505***1 span bridge in Multnomah Co., to C. J. Montague, Portland, $27,898. Bids Oct. 11. Noted Sept. 27.

Tex., Port Isabel—Padre Island Bridge Co., c/o C. R. Tyrrell, also c/o J. W. Pate, McAllen, timber pile trestle vehicular causeway across Laguna Madre between Pt. Isabel and Padre Island, treated timber piling and heavy treated lumber flooring, to James & Littrell, Ruston, La., $288,000. Est. $350,000. **P.W.A.**

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STREETS AND ROADS

BIDS ASKED

Arizona—Nov. 8, by State Hy. Comn., Phoenix, grading, curbing, guttering, placing 2 in. asphaltic retread surface and selected material on Prescott-Flagstaff Hy., NRM 96-A, about 3,100 cu.yd. roadway excav. T. S. O'Connell, state hy. engr.

Delaware—Nov. 7, by State Hy. Dpt., Dover, laying 22 ft. pavement on Northeast Blvd., Edgemoor-Hollyoak, Contr. 350 NRS 11-D, New Castle Co. W. W. Mack, Dover, engr.

Idaho—Nov. 2, at office G. E. McKelvey, comr. P. Wks., Boise, crushed gravel surfacing 4.475 mi. Sawtooth Park Hy., Richfield Branch, between Shoshone and Richfield, Lincoln Co., incl. 12,000 cu.yd. excav., solid rock and 54,000 cu.yd. common excav., 130 cu.yd. structure excav., for culverts and 20 cu.yd. structure excav. for bridges.

Illinois—Nov. 1, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bituminous filled brick on concrete paving 1.25 mi. Main St., Salem, Sect. 16 NRM, Marion Co.; gravel or crushed stone surfacing 2.09 mi. road from Champman to Coffeen Rd., Sect. 76 NRS, Montgomery Co.; concrete paving 2.7 mi. road from Route 12 toward Scott Field, B-NRS, St. Clair Co.; grading 3.02 mi. Route 143 to Raleigh east toward Eldorado, Sect. 30A-NRM Saline Co.; subway structure at Springfield, Sect. 107 B NRM, Sangamon Co.; and bridge on Sect. 78 NRS, Montgomery Co. E. Lieberman, ch. hy. engr.

Ill., Edwardsville—Madison Co., bids early in 1935, 5 mi. stretch Route 150, north of Edwardsville; completing 10 mi. road from Edwardsville to Route 11; widening 4 mi. National Trail west of Collinsville and approaches to new overhead bridge under construction at Madison; constructing 2 rein.-con. viaducts to eliminate grade crossings. $1,225,483. P.W.A. allotted $335,000. W. E. Howden, County House supt.

Ill., Paxton—Oct. 31, by Dpt. P. Wks. & Buildings, Div. Hys., traffic bound surface course paving 3.9987 mi. Sect. 7-MFT, Ford Co. G. H. Baker, engr. co. roads and city streets.

Ind., Fort Wayne—Nov. 8, by Bd. Pub. Wks., paving Main St. from Union to Rockhill Sts. S. S. Snyder, Fort Wayne, engr.

Kansas—Oct. 30, by State Hy. Comn., at office of County Clerk, Atwood, roadside improvement, earthwork, culverts, sand gravel surfacing 21.052 mi. hys. in Decatur, Ellis, Phillips, Osborne, Rawlins, Thomas and Sheridan Counties.

Kansas—Oct. 31, by State Hy. Comn., at office of County Clerk, Clay Center, earthwork, culverts, concrete and bit. filled brick paving 0.635 mi. hy. Jewell Co. and earthwork, culverts, two 90 ft. steel truss spans, and 128 ft.-160 ft.-128 ft. continuous steel truss spans, roadside improvement 0.524 mi. hy. Clay Co.

Kansas—Nov. 2, by State Hy. Comn., at office of County Clerk, Hiawatha, earthwork, culverts, roadside improvements 1.909 mi. Project NRS 470-C (1935) Osage Co.; 3.272 mi. Project 30-34 NRH 348-A (1935) Brown Co.; concrete paving 0.43 mi. Project 50S-32 and 33 NRM 30E, Parts 1 and 2 (1935) Lyon Co.

Kansas—Nov. 2, by State Hy. Comn. at office of County Clerk, Hiawatha, sand gravel resurfacing 16.5 mi. Project 36-35-6287, Doniphan Co.

Kansas—Nov. 8, by State Hy. Comn., at office of County Clerk, Dodge City, concrete paving and roadside improvement 0.331 mi. Project 50N-6A-NRM 359 E (1935) Finney Co.

Kansas—Nov. 8, by State Hy. Comn., at office of County Clerk, Dodge City, concrete paving, roadside improvement, 0.128 mi. Project 283-5 NRM 233 E (1935); earthwork and culverts 5.132 mi. Project NRS 489-A, both Ford Co.

Kentucky—Nov. 9, by State Hy. Comn., Frankfort, grading, drainage 5.1 mi. Fredonia-Flat Rock Rd., State Project 317, Caldwell Co.; 2.9 mi. Arlington-Columbus Rd., Carlisle Co.; 5.7 mi. Louisa-Sandy Hook Rd., State Project 49, Lawrence Co.; low type surfacing 3 mi. Princeton-Shady Grove Rd., Caldwell Co.; 3.5 mi. Benton-Birmingham Rd., Marshall Co.; 1.9 mi. Brodhead-Eubank Rd., Rockcastle Co., all foregoing State Projects; furnishing materials and installing electric navigation lighting system on Ohio River Bridge, Henderson, MP 8 TB-2, Henderson Co.

Louisiana—Nov. 6, by State Hy. Comn., Baton Rouge, concrete paving 7.727 mi. Project 4807-B, on intersection Route 1252 to Elliot City Hy. in St. Landry and Pointe Coupee Parishes, W. H. Norckauer, state hy. engr.

Maryland—Oct. 30, by State Roads Comn., Baltimore, macadam paving 0.63 mi. Contr. CL-159-1-52, Federal Aid Project NRS 349 (1935) Carroll Co.; stabilized earth paving 0.74 mi. Contr. Wo-156-1-12, Federal Aid Project NRS 347-A (1935) Worcester Co.

†*Federal Government.*

Streets and Roads (Continued)

Minnesota—Nov. 2, by State Hy. Comn., St. Paul, grading 2 mi. State Project 1-166-22-4-A F.P. 7-G, incl. 40,217 cu.yd. excav.; 9 mi. S.P. 6-34-26-3 NRH 368-F and S.P. 6-34-26-2A, NRHM 368-G, 298,471 cu.yd. excav.; 4.6 mi. S.P. 22-39-24-1, NRH and M 366-D and E, and S.P. 109-124-21-1, NRS 494-A, 67,000 cu.yd. excav.; 4 mi. S.P. 23-185-21-3A, NRH and M 503-A and B, 89,110 cu.yd. excav.; 2.8 mi. S.P. 52-153-22 NRH and M 28-A and B, 156,337 cu.yd. excav.; 4.3 mi. S.P. 55-142-23-2B, NRS 495-B, 94,607 cu.yd. excav.; 3.4 mi. S.P. 83-83-21, NRS 598-A, 61,528 cu.yd. excav.; gravel-ing 14.6 mi. S.P. 6-61-24-1 and 2 NRS 453-A and B; 13.4 mi. S.P. 39-88-21-1, NRS 475-A; 8.6 mi. S.P. 67-67-21-3, NRS 459-A.

Miss., Grenada—Nov. 5, by Mayor, concrete paving, curbing, guttering, storm sewers in 1,800 ft. Main St. from old pavement end to inter-section with U. S. 51. W. E. Johnson, Grenada, engr.

Mo., St. Louis—Nov. 13 (extended date), by Bd. P. Serv., City Hall, grading, rein.-con. paving 13,830 sq.yd. River Des Peres Parkway from Loughborough to Landsdowne Aves., $105,-000; 27,150 sq.yd. River Des Peres Parkway from Morganford Rd. to Loughborough Ave., $129,400; refined asphalt paving 720 sq.yd. 13th St., from Chestnut to Pine Sts., $5,800. L. A. Pettus, city engr.

New York—Oct. 30, by A. W. Brandt, comr. Hys., Albany, concrete paving 1.8 mi. Nassau and Queens Counties; graveling 5.51 mi. Cattar-augus Co.; 6.22 mi. Orange Co.; 3.85 mi. Tioga Co.; bituminous macadam paving 4.06 mi. Erie Co.; 5.63 mi. Essex Co.; 3.27 mi. Columbia Co.; grading 1.71 mi. Queens Co.; bridge in Suffolk Co.

N. Y., Buffalo—Nov. 1, by Dpt. P. Wks., G. J. Summers, comr., City Hall, repaving Depot, East North, Beech, Vermont, Pennsylvania, Rose and Grape Sts.

Ohio—Nov. 2, by O. W. Merrell, dir. Hys., Columbus, brick paving, incl. furnishing, de-livering brick and landscaping 0.908 mi. Sect. "K-2" (part) National Rd., Belmont Co., $92,-989; tar macadam paving 2.214 mi. Sect. "R" (part) Hillsboro-Washington C. H. Rd., High-land, $54,628; tar macadam paving and con-structing three 36 ft. span, concrete beam bridge on 0.482 mi. Sect. "S" (part) Caldwell-McCon-nelsville Rd., Morgan Co., $44,583; grading, drainage structures 3.774 mi. Sects. "A" and "G" Van Wert-Paulding Rd., Paulding Co., $80,352; brick paving, incl. furnishing, delivering brick, and landscaping 1.389 mi. Sect. "J" and "Clyde" (part) Fremont-Bellevue Rd., Sandusky Co. $146,537. P.W.A. project.

†**Oregon**—Oct. 31, by Pub. Rds., P. O. Bldg., Portland, clearing, grading, culverts 7.4247 mi. Umatilla Natl. Forest Rd., Umatilla and Union Counties. W. H. Lynch, Portland, dist. engr.

Pennsylvania—Nov. 2, at office of S. S. Lewis, secy. Hys., Harrisburg, bituminous penetration on native stone or modified broken stone paving 20,848 ft. R-383, Sect. 1, Antis Twp., Blair Co., involving 69,931 cu.yd. Class 1, 1,441 cu.yd. Class 2, and 193 cu.yd. borrow excav.; bituminous penetration surface P.M. 2 on native stone base, steel stringer bridge, 5,642 ft. R-36870, Brecknock Twp., Lancaster Co., 4,639 cu.yd. Class 1, 258 cu.yd. Class 2, and 139 cu.yd. borrow excav.; bituminous penetration on native stone paving 14,943 ft. R-49015, Coal and Mt. Carmel Twps., Northumberland Co., 18,620 cu.yd. Class 1, and 667 cu.yd. Class 2 excav.

Pa., Phila.—Oct. 30, by Dpt. P. Wks., curb-ing and footway work city line from Bala Ave. to Overbrook Ave. and various alleys and drive-ways. Dpt. P. Wks., City Hall Annex, engr.

Tennessee—Nov. 2, by State Dpt. Hys., and P. Wks., Nashville, paving 4.09 mi. Hy. 3, NRH R-8-A (1935), parts I and II; 4.4084 mi. State Hy. 3, NRH 271-D (1935) and NRM 271-C (1935) both Shelby Co.; constructing bridge and approaches over Little Emory River on State Hy. 61, NRS 287-B, Roane Co.; grad-ing, drainage, 4.763 mi. State Hy. 69, NRS 290-B, Benton Co.; 1.178 mi. State Hy. 6, NRH 206, Parts II and III, Davidson Co.

†**Tennessee**—Pub. Rds., Dpt. Agriculture, at office acting Superintendent, Meriwether Lewis Natl. Monument, did not award contract on bids Sept. 21 for improving roads in Meriwether Natl. Park. Bids were rejected and readvertised to be opened Nov. 1. (**Correction**—Status of project.) Noted Oct. 11, under "contracts Awarded."

Washington—Nov. 7, by L. V. Murrow, dir. Hys., Olympia, concrete paving and retopping existing brick paving with asphaltic concrete on 4 mi. Old-Pacific Hy., Lake Forest to Bothell, Unit 3, NRH 91-B and NRM 91-C, King Co., incl. 18,670 cu.yd. excav.; 0.5 mi. State Rd. 1, Market St., between Division and Main Sts., Chehalis, NRM 57-D, Lewis Co.; grading, drain-ing, crushed stone surfacing 1.9 mi. Port Blake-ley to Agate Pass Rd., Bainbridge Island-Port Blakely-North NRS 212-A, in Kitsap Co., 29,-920 cu.yd. excav.

†**Washington**—Nov. 7, by Pub. Rds., Port-land, Ore., clearing 24 acres Steven Canyon, Mount Rainier Natl. Park; 30 acres Stevens Canyon Rd., Mount Rainier Natl. Park, both Lewis Co. W. H. Lynch, dist. engr.

Wisconsin—Nov. 7, by State Hy. Comn., Madison, grading, draining 1.79 mi. Milwaukee-Green Bay Rd., S.T.H. 60-County Trunk X Sect. NRH 479-D, Ozaukee Co., incl. 80,184 cu.yd. earth and 2,000 cu.yd. loose rock excav.; 4.886 mi. Burlington-Hartford-Fond du Lac Rd., S.T. Hy. 83, NRS 511-A, Washington Co.; graveling 15,706 cu.yd. Burlington-Hartford-Fond du Lac Rd., NRS 511-A, Washington Co.

†*Federal Government.*

CONTRACTS AWARDED

California—State Hy. Comn., State Bldg., Los Angeles, bituminous treated crushed gravel or stone surfacing, grading 0.6 mi. approaches to Escondido Creek Bridge, San Diego Co., to Sharp & Fellows Constr. Co., Central Bldg., Los An-geles, $42,808. Bids Oct. 11. Noted Sept. 27.

†**California**—Pub. Rds., San Francisco, grad-ing, constructing bridge on 0.571 mi. road in Humboldt Co., to Hemstreet & Bell, 501 11th St., Marysville, $52,774. Est. $43,782. Bids Sept. 25, awarded Oct. 9. Noted Sept. 13.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 0.14 mi. Kane Co., to Jaicks Co., Winfield, $7,044***0.3 mi. Cook Co., to G. L. Tarelton, Chicago, $29,042***4.67 mi. Morgan Co., to File & Collins, Decatur, $122,-704***2.02 mi. Lake Co., to E. M. Melahn Constr. Co., Algonquin, $92,954***0.43 mi. La Salle Co., to Illinois Valley Constr. Co., Ottawa, $21,744***bituminous surfacing 1.11 mi. White-side Co., to Aldrich Constr. Co., 111 West Wash-ington St., Chicago, $11,581***0.05 mi. St. Clair Co., to J. Mackler & Co., Chicago Heights, $22,707***widening road Marion Co., to H. R. Cawood, Mount Vernon, $4,607***0.46 mi. Du-page and Cook Counties, to Milburn Bros., Mount Prospect, $37,830***0.16 mi. Bureau Co., to H. J. Eppel, Pontiac, $9,830***0.32 mi. Bond Co., to Hartmann-Clark Bros. Co., Peoria, $12,512***6.6 mi. Alexander Co., to Egyptian Constr. Co., Herrin, $177,759***0.86 mi. St. Clair Co., to M. Hoeffken & Co., Belleville, $30,-544***6.11 mi. Franklin Co., to Edwardsville Constr. Co., Edwardsville, $153,808, all foregoing not P.W.A. projects***0.55 mi. Vermilion Co., to R. McCalman, Inc., Danville, $19,708***0.53 mi. Vermilion Co., to General Paving Co., Champaign, $15,898***0.64 mi. road and 0.31 mi. road in Vermilion Co., to McCarthy Impvt. Co., Davenport, Ia., $15,943 and $11,272 re-spectively***3.04 mi. Clay Co., to French Con-str. Co., Fairfield, $25,716***4.65 mi. Menard Co., to Hurden Constr. Co., Springfield, $107,-114***3.75 mi. Shelby Co., to H. V. Pipp Co., Terre Haute, Ind., $16,810, all foregoing P.W.A. Grand total $947,186. Bids Aug. 28, Sept. 20 and Oct. 9. Noted Aug. 16, Sept. 13, and Oct. 4.

Indiana—State Hy. Comn., Indianapolis, bitu-minous mulch, liquid asphalt paving 4 mi. roads in Morgan Co., to L. Martine, Laporte, $18,732 ***6 mi. Johnson Co., to R. McCalman, Inc., Danville, Ill., $24,463***7 mi. Brown Co., to R. Myers, Campbellsburg, $27,546. Grand total $70,741.

Iowa—State Hy. Comn., Ames, concrete paving 0.904 mi. Lucas Co., to Capitol Constr. Co., 1207 Cherry St., Des Moines, $36,509***1.115 mi. Polk Co., to Wright Constr. Co., 102 Forest St., Des Moines, $51,442***grading 0.062 mi. Humboldt and Wright Counties and 2.541 mi. Wright Co., to L. O. Kimball, Clear Lake, $3,-497 and $12,949 respectively***8.347 mi. O'Brien and Osceola Counties, to Paul Betz Constr. Co., Sioux City, $33,910***graveling 5.042 mi. Dickinson Co., to J. A. Huff, Arm-strong, $4,388***graveling 7.418 mi. Emmet Co. and 11.046 mi. Greene and Guthrie Counties, to Harvey Sand & Gravel Co., Harvey, $6,282 and $9,994 respectively. Grand total $158,971. **P.W.A.** Bids Oct. 9, awarded Oct. 16. Noted Oct. 4.

Iowa—State Hy. Comn., Ames, concrete pav-ing 42,235 sq.yd. road in Kossuth Co., to Metz Constr. Co., Clear Lake, $89,300. **P.W.A.** Bids Sept. 25. Noted Sept. 20.

Kansas—State Hy. Comn., Garden City, (**P. means Project**), to Yancey Constr. Co., Abilene, earthwork and culverts 7.062 mi. hy., $20,369; Bridge 1, five 10x10x32 ft. rein.-con., P. 23-7 NRS 469-D, (1935), $4,217; Bridge 2, six 10x9x32 ft., rein.-con., $4,639, all foregoing on P. 23-7 NRS 469 D. (1935), Finney Co.; earthwork culverts 6.013 mi. P. 23-8 NRS 469 C (1935) Lane Co., $22,881; earthwork, culverts, sand gravel surfacing 1.001 mi. P. 83-10 NRH 248 B, Scott Co., $4,738; earth-work, culverts 4.886 mi. P. NRS 480 B (1935) Seward Co., $25,849***to Lawson Landscape Service, McPherson, roadside improvement 7.062 mi. P. 23-7 NRS 469 D (1935), Finney Co., $410; 6.013 mi. P. 23-8 NRS 469 C (1935) Lane Co., $360***to Cook & Waddell, Ottawa, Bridge 1, five 30 ft. rein.-con. deck girder spans, P. 23-8 NRS 469 C (1935) Lane Co., $10,435 ***to Geo. W. Condon Co., 219 Grain Exchange Bldg., Omaha, Neb., earthwork, culverts 4.718 mi. P. 50N-7 NRH 359 A-1, (1935), $24,223 ***to M. W. Watson, Topeka, sand graveling 3.718 mi. Hodgman Co., $2,476***to A. L. Cook, Ottawa, roadside improvement 3.718 mi. P. 50N-7 NRH 359 A-1 (1935), Hodgeman Co., $158; 1.001 mi. P. 83-10 NRH 248 B (1935) Scott Co., $115***to B. Anderson, Soldier, Bridge 1, two 12x10x32 ft., rein.-con., P. 50N-7 NRH-359 (A-1 (1935) Hodgeman Co., $2,639; Bridge 2, two 12x12x32 ft., on same road, $2,-950. Grand total $126,459. **P.W.A.** Bids Oct. 9, awarded Oct. 15. Noted Oct. 4.

Kansas—State Hy. Comn., at office of County Clerk, Leavenworth, to R. G. Aldridge, 1609 Nebraska St., Kansas City, Kan., earthwork and culverts 1.251 mi. Project 11-23 NRH 432 C (1935), $18,033 Bridge 1, 6:0 ft.-70 ft.-60 ft. continuous I-beam spans, Project 11-23 NRH 432 C (1935), $17,487; roadside improvement 1.251 mi. Project 11-23 NRH 432 C (1935) $175, all foregoing in Pottawatomie Co.; 5-58x 72.5x72.5x58, continuous I-beam span bridge, Project NRS 490 B, (1935) Brown Co., $22,-405***to Roberts Constr. Co., Wichita, earth-work, culverts, concrete paving 1.17 mi. Project 73 E-39 NRH 376 B (1935) Leavenworth Co., $34,280***to A. L. Cook, Ottawa, roadside im-provement 1.17 mi. Project 73 E-29 NRH 376B (1935) Leavenworth Co., $406***to H. Spit-coufsky, Kansas City, concrete paving 0.099 mi. Wyandotte Co. $19,070. Grand total $111,856. **P.W.A.** Bids Oct. 12, awarded Oct. 15.

Kansas—State Hy. Comn., at office of City Clerk, Pittsburg, to E. Graff, Fredonia, earth-work, culverts, 8.64 mi. Project 11-5 NRH 405 D (1935) Chautauqua Co., $41,831***to A. C. Sherwood Constr. Co., Independence, 2.08 mi. Project 75-5 NRH 23 A (1935) Montgomery Co., $17,052***to Scherrer & Bennett, Kansas City, Mo., 2.211 mi. Project 96-26 NRH 396 C (1935) Greenwood Co., $28,937***to J. Coffey Junction City, 2.161 mi. Project 75-16 NRH 402 F (1935) Coffey Co., $38,269***to A. L. Cook, Ottawa, roadside improvement 8.64 mi. Project 11-5 NRH 405 D (1935) Chautauqua Co., $659; 2.08 mi. Project 75-5 NRH 23 A (1935) Montgomery Co., $494; 2.211 mi. Proj-ect 96-26 NRH 396 C (1935) Greenwood Co., $223; 4.97 mi. Project NRS 477 C (1935) Crawford Co., $646; 2.161 mi. Project 75-16 NRH 402 F (1935) Coffey Co., $352***to B. Anderson, Soldier, Bridge 1, three 10x10x32 ft. rein.-con., Project 11-5 NRH 405 D, Chautauqua Co., $2,979; Bridge 1 two 12x12x32 ft., rein-con., Project 75-16 NRH 402 F (1935) Coffey Co., $3,048***to W. Beekman, Arkansas City, concrete paving 4.97 mi. Project NRS 477 C (1935) Crawford Co., $122,226***to A. V. Eulich, Kansas City, Mo., Bridge 1, two 9x9x45 30 skew span, Project 75-5 NRH 23 A (1935) Montgomery Co., $2,679. Grand total $259,395. **P.W.A.** Bids Oct. 5, awarded Oct. 6.

Kentucky—State Hy. Comn., Frankfort, grad-ing, draining 4.963 mi. Augusta-Cynthiana Rd., NRS 342-AG (1935) Bracken Co. to R. E. Mills Co., Inc., Frankfort, $23,173***traffic bound limestone paving 4.034 mi. Belmont-Woolridge Ferry Rd., NRS 337-AS (1935) Bul-litt Co., to Highland Co., Inc., 644 Baxter Ave., Louisville, $15,018***grading, draining 4.047 mi. Grayson-Sandy Hook Rd., NRS 268-BG, Carter Co., and 2.099 mi. La Grange-Shelbyville Rd., NRS 339-AG (1935) Oldham Co., to R. Myers, Campbellsburg, Ind., $36,000 and $24,-541 respectively***5.118 mi. Booneville-Man-chester Rd., NRS 332-AG (1935) Owsley Co., to Ruth Bros., Georgtown, $58,802***underpass and approaches on Center St., Corbin, NRM 23-FB, Whitley Co., to Codell Constr. Co., Win-chester, $71,362, foregoing bids Oct. 8***por-tion of Elizabethtown-Leitchfield Rd., NRH 147-DG, Hardin Co., to Young & Lyons, Rogers-ville, Tenn., $8,911. Bids Aug. 24. Grand total $237,807. Noted Aug. 16 E.N.-R.

Kentucky—State Hy. Comn., Frankfort, to Ralph Rogers & Co., Bloomington, Ind., traffic bound limestone paving 6.922 mi. Anderson Co., $22,598; rock asphalt on surface mix binder, using LO and ACB and waterbound macadam base paving 0.36 mi. Christian Co., $24,385; traffic bound macadam paving 4.84 mi. Green Co., $15,884; traffic bound limestone paving 7.843 mi. Metcalfe Co., $22,245; 9.299 mi. Pulaski Co., $25,591***to Frazer & Cocke, Wickliffe, grading, draining 3.036 mi. Ballard Co., $19,598***to Cumberland Constr. Co., Burkesville, 1.887 mi. Cumberland Co., $24,060; 1.136 mi. Monroe Co., $24,789***to J. G. Exterkamp, Covington, 4.862 mi. Grant Co., $22,076***to G. L. Brantley, Winchester, 3.115 mi. Marion Co., $27,000***to A. W. Walker & Son, Danville, superstructure for bridge over L. and N. R.R. tracks at Benham, Harlan Co., $21,178***to W. F. Robinson & Son, Owens-boro, concrete widening 1.241 mi. Henderson Co., $30,519; traffic-bound limestone paving 5.359 mi. Wolfe Co., $32,966***to Corum Bros., Madisonville, substructure and approaches for bridge on Hardin-Edgners Ferry Rd., Marshall Co., $35,509; superstructure for same, $10,202 ***to Carey-Reed Co., Lexington, bituminous surfacing 1.638 mi. Mercer Co., $37,820*** to Cundiff & Colyer, Somerset, traffic bound limestone paving 3.762 mi. Russell Springs-Columbia Rd., NRH 242-AS, $12,480; 3.737 mi. same road NRH 211-CS, $13,457, both Russell Co.***to Myers & Gorman, Flemings-burg, rock asphalt paving 1.173 mi. streets in Cadiz, Trigg Co., $12,886. Grand total $435,-245. **P.W.A.** Bids Oct. 5. Noted Sept. 27.

Kentucky—State Hy. Comn., Frankfort, grad-ing, draining 7.287 mi. London-Barbourville Rd., S.P. 144 AG, Laurel Co., to E. A. Chilton & Co., London, $95,374; concrete paving 13,632 mi. Corbin-Williamsburg Rd., S.P. 22 AS and 712 AS (combined), Whitley Co., to F. C. Gor-rell & Sons, Russellville, $308,735. Bids Sept. 21. Noted Sept. 6.

†**Mass., Chelsea**—Treas. Dpt. at office Sup. Archt., Wash., D. C., concrete curbings on various streets of Marine Hospital Grounds, to J. F. Shea & Co., Inc., 41 Hollingsworth St., Dorchester, $2,550. Awarded Oct. 15.

Mass., Malden—City Street Dpt., City Hall, sheet asphalt surfacing 14,000 sq.yd. Main St., to Macsphalt Corp. of Mass., 9 Water St. (rear), Cambridge, $1.45 per sq.yd. Bids Oct. 15, awarded Oct. 17.

Mississippi — E. D. Kenna, dir. State Hy. Comn., Jackson, to Barber Bros. Constr. Co., Baton Rouge, La., alternate types paving 3.768 mi. Panola and Tate Counties, $70,671 est. $77,-000; 4.408 mi. Grenada Co., $83,433 est. $90,-000; 5.326 mi. Leflore Co., $118,381 est. $100,-000***to Hartman-Clark Constr. Co., Peoria, Ill. grading, drainage structures, bridging, gravel

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Streets and Roads (Continued)

surfacing 3.556 mi. Quitman Co., $64,369 est. $80,000. Grand total $336,854. **P.W.A.** State Hy. Comn., E. D. Kenna, dir., Jackson, withdrew bids to have been opened Oct. 12, paving 0.288 mi. City of Greenwood, Leflore Co., $11,200. Will readvertise. Noted Oct. 4.

Mississippi — E. D. Kenna, dir. State Hy. Comn., Jackson, alternate types paving 7.672 mi. Jackson-Wesson Hy., Copiah Co., to Cobb Bros. Constr. Co., Meridian, $137,418 est. $140,000 ***grading, drainage structures and bridges, 1.145 mi. Durant-West Hy., and 3.787 mi. Durant Hy., NRH 47, Parts 1 and 2, Holmes Co., to Rouse Constr. Co., Cape Girardeau, Mo., $59,221 and $70,868 respectively, est. $70,000 and $100,000 respectively. Grand total $267,507. **P.W.A.** Bids Oct. 9. State Hy. Comn. withdrew project consisting of alternate types paving 5.349 mi. Sunflower-Ruleville Hy., Sunflower Co., $115,000. Will readvertise.

Nebraska—State Hy. Dpt., Lincoln, paving 2.6 mi. NRH project 56, Div. 3, (1935) F. A. Rd. Aurora-York, Hamilton Co., 20 ft., to Roberts Constr. Co., Lincoln, $75,764. Est. $75,764. **P.W.A.**

†**Nevada**—Pub. Rds., San Francisco, Calif., grading, placing crushed gravel base course 12.216 mi. road in White Pine and Nye Counties, to Dodge Constr. Co., Inc., Fallon, $121,716. Est. $121,891. Bids Oct. 9, awarded Oct. 13. Noted Sept. 27.

New Hampshire—State Hy. Dpt., F. E. Everett, comr., Concord, graveling 12.1 mi. road in Conway and Albany, NRF 8-A, to T. E. Malloy, Gorham, $78,705***asphaltic cold mix paving 0.293 mi. hy. Milford, NRH 233-E, to Winslow & Cummings, Nashua, $10,206***rein.-con. paving 0.358 mi. hy. Berlin Project NRM 136-I, to Central Constr. Co., 316 Essex St., Lawrence, $48,470. Grand total $137,381. **P.W.A.** Bids Oct. 15.

New Hampshire—State Hy. Dpt., Concord, 3 in. bituminous macadam on broken stone surfacing 1.893 mi. New Hampshire College Rd., 20 ft., Newmarket and Durham, Rockingham and Strafford Counties, to G. Rotundi & Son, 199 Laurel St., Melrose, Mass., $58,675 est. $67,000; crushed gravel paving 1.8 mi. South Mammoth Rd., 24 ft., Manchester, Hillsboro Co., to John Iofalla Constr. Co., Dedham, Mass., $35,449 est. $42,000. Bids Oct. 11. Noted Oct. 4.

New Jersey—State Hy. Comn., Trenton, grading, rein.-con. paving 146,481 sq.yd. road in Morris Co., to G. M. Brewster, Bogota, $631,916. Bids Oct. 15. Noted Oct. 4.

N. Y., New York—J. J. Lyons, pres. Bronx Boro, County Bldg., 161st St. and Concourse, to Leonard Paving Co., granite paving East 152nd St., $15,667***to J. Meehan Paving Co., 90 West St., East 167th St., $145,588***to Bronx Asphalt Corp., 900 Zerega Ave., Southern Blvd., $71,262***to Venetian Contg. Co., 2 Lafayette St., asphalt paving Southern Blvd., $61,181; Jerome Ave., $76,118; Brook Ave., $62,163*** to J. Long & Sons, 2624 St. Raymond Ave., sewer in Patterson Ave., $900. Grand total $432,879. Bids Oct. 3. Noted Sept. 27.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, asphalt block paving Victory Blvd., to Road Materials Corp., 17 State St., New York, $57,054. Bids Sept. 26.

Ohio—O. W. Merrell, dir. Hys., Columbus, concrete widening 8.744 mi. Dayton-Greenville Rd., Darke and Miami Counties, to Manix Bros., Greenville, $116,316***tar macadam paving 2.045 mi. hy. and constructing concrete beam bridge with steel beams, approaches, etc., Defiance-Delphos Rd., Defiance Co., to W. J. Johnson Constr. Co., 611 High St., Hicksville, $80,234 ***brick paving, incl. furnishing, delivering brick 1.424 mi. Ohio River Rd., Jefferson Co., to Loesch & Green Co., 4211 32nd St., Cleveland, $73,363***tar macadam paving 3.49 mi. Toledo-Waterville Rd., Lucas Co., to Dorsey Constr. Co., 1130 South Main St., Findlay, $91,487***bituminous macadam paving 2.73 mi. Dayton-Lebanon Rd., Montgomery Co., to Republic Asphalt Paving Co., North Summit St., Dayton, $68,064. Grand total $429,464. Bids Oct. 13. Noted Sept. 27.

Ohio—O. W. Merrell, dir. Hys., Columbus, brick on concrete paving 0.805 mi. Sect. "Columbus" (North High St. from Oakland Park Ave. to Dunedin Rd.) Columbus-Sandusky Rd., Franklin Co., to A. W. Burns Constr. Co., 424 Woodland Ave., Columbus, $6,262***traffic bound macadam paving 1.735 mi. Sect. "G" Millersburg-Dover Rd., Holmes Co., to W. P. McCarren, Walholding, $33,775. Bids Oct. 6. Noted Sept. 27.

O., Cleveland—Bd. Comrs. Cuyahoga Co., grading, guttering, asphaltic macadam paving 10,826 sq.yd. Cedar Point Rd. from Greyton to Ruple Rds., to Garland Bros. Co., 5806 Franklin Ave., $24,332. Est. $31,000. J. O. McWilliams, Court House, engr. Noted Sept. 27.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving 1.38 mi. Route 119, Sect. 8, Ligonier Twp., Westmoreland Co., to A. Eidenmiller, Greensburg, $72,560***1.02 mi. Route 53, Sect. R-4, Juniata Twp., Blair Co., to Holmes Constr. Co., Wooster, O., $45,408, bids Sept. 28***widening existing pavement with rein.-con., incl. integral curb, etc., 0.41 mi. Route 719, Sect. 2, Lower Merion Twp., Montgomery Co., to Dalton Bros., Inc., Paoli, $17,389***bit. surface course Spec. "E" on native or modified stone paving 2.77 mi. Route 39056, Sect. 2, Lynn and Heidelberg Twps., Lehigh Co., to H. R. Miller, Box 203, Lebanon, $15,655***native stone or modified stone base with bit. penetration surfacing 0.89 mi. Route 236, Sect. 3, Hebron Twp., Potter Co., to C. F. Goeringer, 296 Madison St., Wilkes-Barre, $25,209. Grand total $176,221. **P.W.A.** Bids Oct. 5. Noted Sept. 20 and 27.

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Pennsylvania—At office of S. S. Lewis, secy. Hys., Harrisburg, rein.-con. widening 0.74 mi. Route 113, Sect. 12-A, Beallsville Boro, Washington Co., to Hardy & Rankin Co., Cannonsburg, $16,103; Bids Sept. 21, State project, rein.-con. paving 0.76 mi. and surfacing existing pavement with bituminous Spec. "E" Cottman Ave., city of Phila., Phila. Co., to Dalton Bros., Inc., Paoli, $29,537. Bids Oct. 11. **P.W.A.** Noted Sept. 13 and Oct. 4 respectively.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving 1.25 mi. Mifflin Co., to L. M. Hutchison, Orbisonia, $49,899, bids Sept. 28***rein.-con. paving 0.22 mi. Adams Co., and 0.52 mi. York Co., to John H. Swanger, Brenneman Bldg., Lancaster, $17,691 and $37,692 respectively***0.77 mi. Bucks Co., to L. Donente, 5122 Master St., Phila., $90,745***2.34 mi. Erie Co., to Baldwin Bros. Paving Co., Union Trust Bldg., Cleveland, O., $94,167***penetration on native stone paving 4.18 mi. Clearfield Co., to N. B. Putnam, 2-4 Transfer St., Fort Wayne, Ind., $103,490, all foregoing **P.W.A.** projects***607 ft. rein.-con. bridge and rein.-con. paving on Route 545, Bridge 19, Cecil Twp., Washington Co., to Hardy & Rankin Co., Cannonsburg, $15,223, state project, all foregoing bids Oct. 5. Grand total $408,847. Noted Sept. 27.

Pa., Sewickley—R. G. Woodside, controller Allegheny Co., Pittsburgh, grading, paving, curbing Ohio River Blvd., to Parkview Constr. Co., 373 Boquet St., Pittsburgh, $115,531. Bids Oct. 2. Noted Sept. 27.

South Carolina — State Hy. Dpt., Columbia, bituminous surfacing 3.422 mi. Lancaster Co., to E. D. Sloan, Greenville, $34,846***2.288 mi. Beaufort Co., to C. G. Fuller, Barnwell, $31,398***4.165 mi. Florence Co., to J. B. Britton, Sumter, $44,495***2.023 mi. Lexington Co., to S. S. Newell & Co., Greenville, $16,356*** concrete paving 0.288 mi. Lee Co., to C. D. Fulmer, Leesville, $11,101***0.94 mi. Marion Co., to Carolina Constr. Co., Columbia, $38,014 ***concrete widening 0.096 mi. Kershaw Co. to Rickenbaker Constr. Co., Union, $5,223*** plain concrete widening and asphalt resurfacing 0.443 mi. Orangeburg Co., to Simons-Mayrant Co., Charleston, $12,992. Grand total $194,425. Bids Oct. 2, awarded Oct. 13. Noted Sept. 20.

South Carolina—State Hy. Dpt., Columbia, bituminous surfacing 4.707 mi. Project NRH 125, Sect. 4, and NRM 25, Sect. 3, McCormick Co., to E. D. Sloan, News Bldg., Greenville, $40,239. **P.W.A.** Bids Oct. 2. Noted Sept. 20.

Tennessee—State Hy. Dpt., grading, drainage, paving 0.533 mi. State Hy. 2, NRM 78-D and 78-E, Hamilton Co., to H. E. Wolfe Constr. Co., St. Augustine, Fla., $51,799***constructing 0.284 mi. Frankewing Underpass and approaches on State Hy. 15, NRH 242-D, Giles Co., to Hagen Constr. Co., Fayetteville, $35,819*** paving 2.868 mi. State Hy. 35, NRH 248-B and D, Sevier Co., to Pittman Constr. Co., Rhodes Bldg., Atlanta, Ga., $58,252***constructing bridge over Nolichucky River and 0.266 mi. approaches on State Hy. 70, NRH 266-D, Green Co., to T. M. Strider & Co., Cotton States Bldg., Nashville, $68,904***grading, drainage 1.523 mi. State Hy. 70, NRH 266-E, Greene Co., to Johnson & Mathews, Athens, $31,453***1.23 mi. NRS 403-B, Pickett Co., to Reynolds Constr. Co., White Pines, $14,128. Grand total $260,354. **P.W.A.** Bids Oct. 12. Noted Oct. 4.

Utah—State Rd. Comn., Salt Lake City, sheet asphalt paving 2.731 mi. road between 21st St. and North Ogden City limits, Weber Co., to Wheelwright Constr. Co., Ogden, $88,256 est. $84,455***concrete shoulder paving, etc., 0.613 mi. road between 3rd and 7th Sts., Main St., Brigham City, Box Elder Co., to O. Bundy, Ogden, $36,482 est. $35,642. **P.W.A.** Bids Oct. 16, awarded Oct. 17.

Washington—State Hy. Comn., Olympia, grading, drainage, crushed stone surfacing 3.927 mi. road in Lewis Co., to Lidral Constr. Co., 1006 Securities Bldg., Seattle, $27,272. Bids Oct. 9.

Wash., Seattle—King Co., grading, concrete paving 1.46 mi. West Shore-Lake Sammamish Hy. extension, to Fiorito Bros., 1100 Leary St., $35,942; sidewalks, paving 73,000 sq.yd. South 56th St., to Paine & Galucci, 1521 South Grand St., Tacoma, $16,601. Bids Oct. 8. Noted Sept. 27.

West Virginia—State Rd. Comn., Charleston, improving roads in Praxton Co., to R. W. Fimple, Fairmont, $55,379***clay and Summers Counties, to Monongah Constr. Co., Fairmont, $41,218 and $118,858 respectively***Hampshire Co., to S. T. Brotemarkle Constr. Co., Cumberland, Md., $74,665***Harrison Co., to Ferguson & Edmonston Co., Shinnston, $100,304***Summers Co., to Pinnell & Pfost, Ripple, $58,259 ***Tucker Co., to A. J. Marshall Co., Elkins, $104,760***Wayne Co., to Billups & Wellman & Co., Huntington, $43,167. Grand total $596,611. **P.W.A.** Bids Oct. 16.

Wisconsin—State Hy. Comn., Madison, grading, draining 0.682 mi. Washburn Co., to Brellinthin Truck & Shovel Service, Inc., Elkhorn, $7,470***6.675 mi. and crushed graveling 6.675 mi. Pepin Co., to A. B. Lynch Co., 610 West Michigan St., Milwaukee, $47,049 and $14,80 respectively***structures in Eau Claire Co. to Hoeppner-Bartlett Co., Eau Claire, $56,80*** Pepin Co., to T. J. Molzahn & Sons, Inc., 205 Security Bank Bldg., La Crosse, $7,710. G and total $133,526. **P.W.A.** Bids Oct. 16. N Noted Oct. 4.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Modesto — Modesto Irrigation Dist. voted to secure P.W.A. loan (election Oct. 9) for canal lining and transmission line, proposed to issue $177,000 in revenue bonds to be security for loan of $157,500 from P.W.A. A grant of $67,500 has been allotted with the loan. Money will finance transmission line to cost $60,000 and concrete lining to cost $165,000. Revenue bonds will be issued against anticipated income of the district's electrical department.

N. C., Statesville—Bd. Comrs. Iredell Co., L. F. Ervin, clk., filed application with P.W.A. for loan to finance drainage for Little Yadkin River in Iredell and Rowan Counties, section where 2nd, 3rd and 4th Creeks empty into the Little Yadkin. $300,000.

†**Nev., Reno**—Treas. Dpt., Wash., D. C., soon takes bids constructing retaining wall along Truckee River in front of federal building. $30,000.

†**North Carolina**—Soil Erosion Service, Wash., D. C., plans soil erosion project on 44 acres on watershed of Reedy Fork, in Guilford and part Forsythe Counties near Greensboro. $150,000.

†**South Carolina**—Soil Erosion Service, Wash., D. C., plans soil erosion service on 50,000 acres Fishing Creek, York Co., watershed, a sub-project of soil erosion service on South Tiger River in Greenville and Spartanburg Counties. $150,000. Dr. T. S. Blue, Spartanburg, will direct work.

Tex., Galveston—Galveston Co., c/o E. B. Holman, judge, revised plans for seawall, incl. steel sheet piling embankments against piling, bituminous surfacing for esplanade submitted to P.W.A. for approval and authority for advertising for bids. Est. $127,900. C. C. Washington, Galveston, co. engr. Noted June 7.

BIDS ASKED

Ala., Birmingham—Nov. 13, by City Comn., certain channel excavation and other work in connection with Sect. 5, Village Creek Drainage Project from 16th St. N. to 26th St. N., involving 45,000 cu.yd. earth and 32,000 cu.yd. rock excav., 70 cu.yd. Class "A" concrete, and 3,000 lb. reinforcing steel. J. D. Webb, city engr.

Ark., West Memphis—Nov. 1, by Bd. Directors St. Francis Levee Dist., at Domicile of Bd., constructing complete drainage ditches, 26 corrugated iron culverts, headwalls along levee and through the embankment of Rock Island R.R., east of Hulbert. Levee miles 152 and 153. H. N. Pharr, West Memphis, ch. engr.

†**Calif., Newport Beach**—Nov. 12, by U. S. Eng., 751 South Figueroa St., Los Angeles, dredging 8,482,000 cu.yd. miscellaneous material and 25,600 cu.yd. rock in Newport Harbor. To exceed $17,750.

†**Ind., Indiana Harbor**—Nov. 7, by U. S. Eng., Chicago, Ill., dredging 1,599,900 cu.yd. from Indiana Harbor.

†**Louisiana**—Nov. 1, by U. S. Eng., New Orleans, dredging 6,500,000 cu.yd. from Whiskey Bay Pilot Channel, St. Martin Parish.

Nebraska—Nov. 1, by Secretary Platte Valley P. & I. Dist., North Platte, 7 radial gates, 3 skimmer weir gates, 4 roller bearing gates with frames, guides, and operating machinery for Sutherland Irrigation Project, D. D. Price, North Platte, ch. engr. Parsons, Klapp, Brinckerhoff & Douglas, 142 Maiden Lane, New York, engrs.

Neb., Columbus—Loup River Public Power Dist., C. B. Fricke, pres., bids about Nov. 22, excavation for tail race, also takes bids early in November, turbines and generators for 2 power houses, $325,000. Harza Eng. Co., 20 North Wacker Dr., Chicago, Ill., engrs. Noted Sept. 27.

†**Nevada**—Nov. 12, by Bureau Reclamation, Denver, Colo., constructing Rye Patch Dam, Humboldt Project near Lovelock, incl. 354,200 cu.yd. all classes open cut excav., 3,000 cu.yd. tunnel excav. Noted Oct. 11.

†**O., Dennison**—Nov. 13, by U. S. Eng., Zanesville, constructing Tappan Dam, near here, incl. 11,000 cu.yd. common excav. for intake and stilling structure, 90,000 cu.yd. common excav., 380,000 cu.yd. excav. in borrow pits.

†**O., Gallipolis**—U. S. Eng., Huntington, W. Va., bids about Nov. 20, constructing Gallipolis Dam, Ohio River, incl. 117,000 cu.yd. common and 13,500 cu.yd. rock excav.

†**Texas**—Nov. 12, by U. S. Eng., Trust Bldg., Galveston, dredging 153,000 cu.yd. in turning basin at Port Bolivar Channel to Port Bolivar.

†*Federal Government.*

Earthwork, etc. (Continued)

†Va., Alexandria—Nov. 8, by U. S. Eng., Wash., D. C., dredging 290,250 cu.yd. from Potomac River, here.

CONTRACTS AWARDED

Calif., Los Angeles—Flood Control Dist., 205 South Bway., S. M. Fisher, engr., furnishing 50 tons stock reinforcing steel for use in cut-off wall at San Gabriel Dam 1, to California Hardware Co., 500 East 1st St., $2,538***furnishing hardware in connection with construction of timber facing of San Gabriel Dam 2, to Union Hardware & Metal Co., 411 East 1st St., $2,211*** 774 MBM lumber, to E. K. Wood Lumber Co., 4701 Santa Fe Ave., $18,264***2,600 bbl. cement, to Monolith Portland Cement Co., 215 West 7th St., $6,370. Grand total $29,383. Bids Oct. 1, awarded Oct. 9.

Calif., San Francisco—P. Utilities Comn., City Hall, constructing levee for extension of Landing Field at San Francisco Airport, Airport Contr. 31, involving 140,000 cu.yd. levee, 10 MFBM spillway, to Piombo Bros. & Co., 1571 Turk St., $78,280. Bids Oct. 4, awarded Oct. 10. Noted Sept. 20.

†Illinois—U. S. Eng., Post Office, Canal and Van Buren Sts., Chicago, dredging 182,500 cu.yd. from channel in Dresden Island Pool, Illinois Waterway at Treats Island, Des Plaines River, to Power Thompson Constr. Co., Joliet, $41,975. Bids Oct. 10. Noted Oct. 4.

†Ill., Waukegan—U. S. Eng., Post Office Bldg., Chicago, furnishing material and repairing rip rap stone in breakwater in Waukegan Harbor, Ill., and Michigan City Harbor, Ind., to Great Lakes Dredge & Dock Co., 104 South Michigan Ave., Chicago, $12,893. Bids Sept. 14. Noted Sept. 13.

La., New Orleans—Bd. State Engineers, constructing Lake Borgne Canal Bank Protection Levee, 60,000 ft. long, 5½ to 6 ft. in height, on Paris Rd. in St. Bernard Parish, involving 270,000 cu.yd. material, to Lester F. Alexander Co., Inc., Audubon Bldg., at 22.7c. per cu.yd. Noted Sept. 27.

†Me., Thomaston—U. S. Eng., Custom House, Boston, Mass., dredging 62,000 cu.yd. in Georges River, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, Mass., at 39½c. per cu.yd. Bids Oct. 11.

Maryland—Anne Arundel Co., Court House, Annapolis, J. A. Cromley, engr., 1,960 lin.ft. creosoted timber bulkhead, to Smith Bros., Galesville, $20,990. Noted Sept. 27.

†Md., Annapolis—Yards & Docks, Navy Dpt., Wash., D. C., dredging at Naval Academy, Spec. 7809, to Arundel Corp., Pier 2, Pratt St., Baltimore, $3,500. Bids Oct. 10.

Minn., Winona—U. S. Eng., 615 Commerce Bldg., St. Paul, constructing earthfilled dike at Lock and Dam 5a, Mississippi River, near here, to Minneapolis Dredging Co., 2429 University Ave. S.E., Minneapolis, $273,367. Bids Oct. 3.

†Mississippi—U. S. Eng., P. O. Box 667, Vicksburg, to Robinson & Young, 912 Louisiana Natl. Bank Bldg., Baton Rouge, 432,000 cu.yd. Item 577R-1 at 18c. per cu.yd.***to W. F. Elkas, Leota Lodge, 100,000 cu.yd. Item 489R-1 23.7c. per cu.yd.: 120,000 cu.yd. Item 508R 23.7c.; and 30,000 cu.yd. Item 510R-1, 21.7c. ***to Kochtitzky & Johnson, Inc., Forrest City, Ark., 77,000 cu.yd. Item 540R-1, 17c. per cu.yd. all foregoing on west bank Mississippi River, in Arkansas and Louisiana***to T. L. James & Co., Inc., and Guilliams Bros., Ruston, La., 782,800 cu.yd. 15c. per cu.yd.***to Driver Co., 62 South Front St., Memphis, Tenn., 311,000 cu.yd. Item 580L-A, 16.4c. per cu.yd.; 360,000 cu.yd. Item 580L-B 16.4c.***to Council & Lewy Co., Greenville, 243,000 cu.yd. Item 986L-1 16.43c. per cu.yd.; 454,000 cu.yd. Item 412L-1 16.43c.; 471,000 cu.yd. Item 420L-1, 16.43c. ***to Louisiana Materials Co., Inc., Southern Bldg., New Orleans, La., 244,000 cu.yd. Item 458L-1, 22.7c. per cu.yd. all foregoing on east bank Mississippi River, in Mississippi. Bids Oct. 2. Noted Sept. 20.

Nebraska—Platte Valley Public Power & Irrigation Dist., G. Gentleman, secy., North Platte, outlet canal project of Sutherland Project, incl. 2,250,000 cu.yd. excavating, excavation and embankment work, to Morrison-Knudsen, Boise, Idaho, $165,277; bridges and miscellaneous structures, to Central Bridge & Constr. Co., Wahoo, $143,619. **P.W.A.** Bids Oct. 5. D. D. Price, c/o owner, ch. engr. Parsons, Klapp, Brinckerhoff & Douglas, 142 Maiden Lane, New York, engrs.

Neb., Lincoln—Sanitary Dist. 1, Lancaster Co., excavating channel for Salt Creek and reconstructing bridge in Saunders Co., to Martin Day Co., Little Bldg., $20,956. **P.W.A.** Bids Aug. 20.

N. M., Farmington—Fruitland Irrigation Dist., installing one 10,000 ft. and one 700 ft. steel syphons, to Hardesty Mfg. Co., 3063 Blake St., Denver, Colo., $42,004. **P.W.A.** Bids Oct. 2.

†N. Y., New York—U. S. Eng., Whitehall St., New York, dredging 6,430 cu.yd. ledge rock and 12,750 cu.yd. material from East River, to Great Lakes Dredge & Dock Co., 17 Battery Pl., $273,986. Bids Sept. 27. Noted Sept. 20.

†Pennsylvania—U. S. Eng., Keenan Bldg., Pittsburgh, dredging Allegheny River, to American Aggregate Corp., Greenville, O., $61,709. Est. $88,463.

†Utah—Bureau Reclamation, Denver, Colo., 72 in. penstock pipe and 60 in. outlet pipe for Pine View Dam, to J. W. Beam, Chicago, Ill., $9,010; steel pipe and fittings for water system, to Associated Piping & Eng. Co. Ltd., 1915 East 51st St., Los Angeles, Calif., $4,196. Bids Sept. 4. Noted Aug. 16.

† *Federal Government.*

UNCLASSIFIED

PROPOSED WORK

Calif., San Jose—RAILROAD DEVELOPMENT—Southern Pacific Co., 65 Market St., San Francisco, revised plans completed and submitted to State Railroad Comn. and San Jose City Council for relocation of tracks in 4th St., incl. construction of 4 grade separation structures, $1,500,000. W. H. Kirkbride, 65 Market St., San Francisco, ch. engr.

Conn., Hartford — AIRPORT — City., Bd. Finance, plans (1st unit) municipal airport terminal, Brainard Field, $16,868 for materials by city, labor $25,302 by Federal Government, F.E.R.A. project. $42,170.

Ill., Chicago—RAILROAD STRUCTURE—Chicago Rapid Transit Co., 72 West Adams St., drawings in progress constructing 600 yd. structural steel elevated railroad structure and station platform. A. W. Gerber, 72 West Adams St., engr.

Ill., East St. Louis—PARK—Circuit Judge Mudge, at Belleville, ruled that ordinance passed by East St. Louis Park Dist. Bd. for issuance of $600,000 in bonds for improving Lake Park in eastern section of city is valid. Noted June 14.

Ind., Gary—PARK—City Council approved plans park improvements, $31,211. W. DeGan, supt. Parks.

Ind., Lafayette—TELEPHONE LINE—Indiana Associated Telephone Co., F. O. Cuppy, mgr., plans new cable in underground construction in Lafayette, Logansport and other cities. $40,000.

Ia., Dubuque—SWIMMING POOL—City, R. M. Evans, mgr., rein.-con. swimming pool and bathhouse. P.W.A. rejected application for $60,000 loan and grant.

Ia., Waterloo—STADIUM—See "Public Buildings."

La., Ruston — STADIUM — Louisiana Tech. University, plans concrete stadium, 3,000 seating capacity. $25,000. Engineer not appointed.

Maryland—PARKS, etc.—Maryland National Capital Park Bd., Silver Springs, making plans various parks and roads, in Montgomery Co. $175,000. Government funds allotted.

N. J., Bayonne—DOCKS, etc.—Municipality, c/o Mayor L. F. Donohoe, City Hall, plans docks, warehouse, fill, terminal railroad, on 800 acre site on east shore. $6,500,000. W. L. Clarkson, city hall, engr. preparing plans for submission for P.W.A. loan.

N. Y., Brooklyn — COAL POCKETS — Bush Terminal Co., 451 1st Ave., plans by Nicholson Co., 405 Lexington Ave., coal pockets, concrete, 47th St. and 1st Ave. $28,000 with equipment.

N. Y., Brooklyn—COAL POCKETS—Roosevelt Coal Corp., 215 43rd St., plans by H. Harriman, 59 Bank St., 1 story, coal pockets, concrete, Smith and Mill Sts. $28,000.

N. Y., Camden—GAS DISTRIBUTION SYSTEM—Bender Syndicate, c/o R. Bender, 81 Herkimer Rd., Utica, plans installing pipes and meters, equipment, etc. $25,000 or more.

N. Y., Cheektowaga—GAS MAINS—Iroquois Gas Co. plans extending gas mains between Union and Borden Rds. on French Rd. and other locations. To exceed $25,000. **Maturity indefinite.**

N. Y., Flushing — COAL LOADING and POCKETS—Fleer Bros., 218 Tompkins Ave., Brooklyn, plans coal loading and pockets Lawrence St. and Flushing River. $28,000. W. Stocker, c/o owner, archt.

N. Y., Niagara Falls—GOLF COURSE—City, O. C. Butler, supt., City Hall, plans improving Hyde Park golf course and athletic grounds, constructing new bandstand in Hyde Park, and improving Porter Rd. to entrance of park. To exceed $17,750.

North Carolina—INDUSTRIAL RAILROAD—Saunders & Cox, Washington, plans logging railroad 0.7 mi. east of Hunters Bridge, 150 ft. north of Roland Creek Bridge, in Beaufort Co.

Okla., Oklahoma City—TUNNELS—Skirvin Hotel, 1st St. and Bway., made plans 2 tunnels under Bway. connecting 2 hotel buildings. $40,000. Layton, Hicks & Forsythe, Braniff Bldg., engrs.

Pennsylvania—SPORTS DEVELOPMENT—International Ladies Garment Workers Union, 3 West 16th St., New York, plans replacing structures destroyed by fire, incl. sports development, park, recreation grounds, etc., in Pike Co., near Delaware Water Gap. To exceed $30,000. W. B. Lescaze, 211 East 48th St., New York, archt.

Pa., York—STABLES and FENCE—York Co. Fair Assn. plans razing old stables at Fair Grounds, erecting new stables and enclosing track with ornamental iron fence. $30,000.

Pa., Erie—AIRPORT—Peninsula Park Comn., Erie Trust Bldg. plans modern airport Peninsula Park. Estimates provide for 25,000 to 30,000 cu.yd. gravel for two 3,500 ft. and one 1,500 ft. runways, also undecided type of bituminous or asphaltic surfacing of runways. $25,000. F. W. Talbot, c/o owner, engr.

N. Y., Brooklyn—RECREATION BUILDING—Dpt. Parks, Arsenal Bldg., Central Park, New York, soon takes bids recreation building, Schermerhorn St. $28,000. A. Embury, c/o owner, archt.

N. Y., Flushing—COAL POCKETS, etc.—Economy Hy. Heat Coal Co., 135-36 40th Rd., plans 1 story coal pockets and coal handling equipment, Lawrence St. and Flushing River. Est. about $28,000.

N. Y., New York—DUMPING PLATFORM, etc.—Dpt. Docks, Pier A, North River, plans fireproof dumping platform and steel sheds, East 46th St. To exceed $100,000. P.W.A. allotted funds. F. T. O'Keefe, c/o owner, engr.

†S. C., Charleston—HANGAR, etc.—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans hangar, barracks, radio ramp and equipment at Coast Guard Air Station. $250,000.

Tenn., Chattanooga—BROADCASTING STATION—Valley Broadcasting Service, Inc., 9th and Broad Sts., R. S. Porter, secy., filed application with Federal authorities for erection of 100 watt broadcasting station. $100,000. Money raised by sale of stock.

Tenn., Dayton — POWER TRANSMISSION LINE—City soon takes bids 3 mi. power transmission line (from TVA line to city). S. K. Hicks, Dayton, engr.

Tex., San Antonio—MAIL TUBE SYSTEM—Texas Pneumatic Tube Co., c/o G. J. Murray, mgr., New York Mail & Newspaper Transport Co., 130 West 42nd St., New York, 25 year franchise granted by City, to build mail tube to operate between local post office and various army fields in vicinity. Most of tube will be underground. $4,000,000.

B. C., Vancouver—ELECTRIC LINE—Electric Railway Co., making plans 60,000 volt line to connect with Nanaimo-Duncan Utilities, $100,000.

Ont., Toronto—HANGAR—Toronto Flying Club bids this month constructing new hangar.

Quebec, Can. and Maine, U.S.A.—Quebec Extension Railway, Quebec City, making plans 90 mi. railway between Portage, Me., and Lac Frontier, Que., $4,168,030.

Que., Montreal—HANGARS, etc.—Montreal Air Transport Ltd. plans new hangars, office buildings, workshops and gas and oil facilities at Barker Airport.

BIDS ASKED

Me., Portland—FLYING FIELD—See "Contracts Awarded."

†La., New Orleans—WHARF—Nov. 12, by Superintendent Lighthouses, New Orleans, constructing (1) 30x500 ft., rein.-con. deck wharf on piles with approaches with railroad trestle and track complete, and full wet pipe sprinkler and standpipe systems (2) concrete deck wharf, 30x96 ft. and Sect. 3 30x144 ft. construction same as in (1), to be erected on west side of Industrial Canal.

Md., Frostburg—DAM—City bids about Nov. 15, 690 ft. concrete dam. Whitman, Requardt & Smith, Charles and Biddle Sts., Baltimore, engrs. P.W.A. project. Noted Jan. 18.

New Jersey—BORINGS—Oct. 29, by State Hy. Comn., Trenton, making of exploratory borings for crossing of Raritan River, above Victory Bridge, at Perth Amboy, Middlesex Co. A. L. Grover, ch. clk.

N. Y., Astoria—SWIMMING POOL—See "Contracts Awarded."

N. Y., New York—SWIMMING POOL, etc.—See "Contracts Awarded."

N. Y., St. Albans—SWIMMING POOL—See "Contracts Awarded."

†Va., Quantico—HANGAR—Oct. 31, by Yards & Docks, Navy Dpt., Wash., D. C., relocating hangar at Marine Barracks, Spec. 7082.

CONTRACTS AWARDED

†D. C., Wash.—TRIANGLE DEVELOPMENT—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing kioska, pylons, etc., to Industrial Fireproof Corp., 110 East 42nd St., New York, $64,974.

†Ill., Danville—ELECTRICAL DISTRIBUTION SYSTEM—Veterans Administration, Arlington Bldg., Wash., D. C., electrical distribution system at Veterans Administration Facility, to Hall Electric Co., Muskegon, Mich. Bids Sept. 25. Noted Sept. 13.

Ind., Whiting—SEWAGE SEPARATOR—See "Sewerage and Waste Disposal."

Me., Portland—FLYING FIELD—City, J. C. Furnival, pres. City Council, City Hall, constructing Stroudwater Flying Field or No. 1 Airport project, consisting of two 120 ft. wide runways, 2,500 ft. long, day labor. Work started. $35,000 P.W.A. allotment. U. S. of America, E. B. Coffin, 60 Grant St., engr. in charge.

†N. Y., Albany — ANTENNA TOWER — Dpt. Commerce, Wash., D. C., constructing steel antenna tower and complete equipment, to Cassidy & Gallagher Co., 11 South Lake Ave.***structural steel, to Malbry Eng. Corp., Albany*** electrical work, to E. G. May, 51 Central Ave. Awarded about Oct. 10. Noted June 28.

N. Y., Astoria—SWIMMING POOL—Dpt. Parks, Arsenal Bldg., Central Park, New York, 165x330 ft., concrete swimming pool, 19th St. and Astoria Park, day labor. To exceed $30,000. A. Embury, c/o owner, archt. Noted Aug. 2.

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Unclassified (Continued)

N. Y., New York—SWIMMING POOL, etc.—Dpt. Parks, Arsenal Bldg., Central Park, swimming pool, bathhouse, at East Houston and Willett Sts., day labor. A. Embury, c/o owner, engr. Est. about $40,000. Noted Aug. 2.

N. Y., St. Albans—SWIMMING POOL—Dpt. Parks, Arsenal Bldg., Central Park, New York, 165x330 ft., concrete swimming pool, St. Albans Park, day labor. $40,000. A. Embury, c/o owner, archt.

North Carolina—PLUMBING—State H. and P. Wks., Raleigh, W. L. Craven, bridge engr., plumbing for prison camp, 1 mi. from Rosman at Calvert Station, Route 28, Transylvania Co., to Hickory Plumbing & Heating Co., Hickory, $2,795.

Pa., Phila.—HIGH SPEED LINE—At office of Secretary of Joint Comn., Administration Bldg., Bridge Plaza, Camden, N. J., laying rails in subway and across Delaware River Bridge, Contr. 6, in connection with high speed line from Phila., Pa., to Camden, N. J., for Delaware River Joint Comn., Bridge Plaza, Camden, N. J., to E. R. Morehouse Co., 315 Market St., Camden, N. J., $737,481. P.W.A.

Pa., Pittsburgh—GATE HOUSES—City, brick, steel, concrete gatehouses, Beechwood Blvd., to H. Butch, 2 Emma St., $44,911. Awarded Oct. 12.

†R. I., Melville — RADIO TOWER REMOVAL — Yards & Docks, Navy Dpt., Wash., D. C., removing radio towers at Naval Fuel Depot, Spec. 7794, to East Coast Steeple Jack Co., 1710 North 12th St., Phila., Pa., $1,435.

Wis., Kaukauna—STREET LIGHTING SYSTEM—City, post glassware for ornamental street lighting system, to Line Material Co., South Milwaukee, $7,000***90,000 ft. cable, to General Electric Supply Co., 190 North Bway., Milwaukee, and to Graybar Electric Co., 778 North Milwaukee St., Milwaukee, at $116 per 1,000 ft.***transformers, to General Electric Co., 940 West St. Paul Ave., Milwaukee, $1,782. Bids Oct. 3.

†T. H., Pearl Harbor—ELECTRIC DISTRIBUTION SYSTEM, etc.—Yards & Docks, Navy Dpt., Wash., D. C., electric distribution system, for Repair Basin at Navy Yard, Spec. 7604, to Alta Electric & Mchy. Co., 407 O'Farrell St., San Francisco, Calif., $378,850. Bids Oct. 3.

MATERIAL AND EQUIPMENT

PROPOSED WORK

CHLORINATOR—**Healdsburg, Calif.**—City to have specifications made for chlorinator.

TELEPHONE EXCHANGE EQUIPMENT—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., rejected bids Apr. 11, furnishing, delivering all materials and equipment necessary for private branch (automatic) telephone exchange, completely installed except station equipment, all conduit, commercial power, ground leads, building wiring and telephones at 6,000 Van Nuys Blvd., Van Nuys, Spec. 1416. To exceed $2,000. Noted Apr. 12.

BRIDGE LUMBER — **Laurel, Miss.** — Bd. Supervs. Jones Co., rejected bids Oct. 3, 150,000 ft. treated and 60,000 ft. untreated bridge lumber. W. L. Busby, co. clk. Noted Sept. 27.

TANKS—**St. Louis, Mo.**—E. Andrews, 1437 South Kingsbridge Blvd., applied for permit to install three 1,000 gal. underground steel tanks for gasoline, at 1457 South Kingshighway Blvd.

TANKS — **St. Louis, Mo.** — Constantino Di Franco, 2107 Edwards St., applied for permit to install one 12,000 gal. underground storage tank, 3500 South Kingshighway Blvd.

TANKS—**St. Louis, Mo.**—Barney Cook, 4326 North Bway., applied for permit to install two 500 gal. gasoline tanks at 4326 North Bway.

TANKS—**St. Louis, Mo.**—P. M. Henderson, 1560 Central Industrial Dr., applied for permit to install two 1,000 gal. gasoline storage tanks at 1560 Central Industrial Dr.

CARS, etc.—**Pennsylvania and New Jersey**—Delaware River Joint Comn., Bridge Plaza, Camden, N. J., soon takes bids Contr. 8, supplying cars and rolling equipment, Modjeski, Masters & Chase, Architects Bldg., Phila., Pa., archts.

BIDS ASKED

PUMPING ENGINE—**Alameda, Calif.**—D. E. Dyer, city clk., taking bids 1,000 gal. triple comb. pumping engine.

†STORAGE TANKS—**Berkeley, Calif.**—Forest Service Experiment Station, Giannini Hall, Berkeley, taking bids 2 storage tanks, 16 gal. circular iron tanks to hold 2,000 gal., about 6 ft. high 8 ft. diam. with one 2 in. connection in bottom of each tank.

DISCONNECTING SWITCHES—**Los Angeles, Calif.**—Nov. 7, by D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., furnishing, delivering 23,000 volt, outdoor type gang-operated by manual mechanism, disconnecting switches, Spec. 1523, four 3,000 amp., eight 1,200 amp. and four 400 amp. inverted type for horizontal mounting (a) f.o.b. cars bidders shipping point (b) f.o.b. cars or trucks, 1630 North Main St.

INSULATORS—**Los Angeles, Calif.**—Nov. 2, by D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering, 1,000 pin-type insulators, 66,000 volt one thousand 1-3/8 in. lead tip insulator pins, Spec. 1532, (a) f.o.b. bidders shipping point (b) f.o.b. Los Angeles. To exceed $2,000.

FIRE HYDRANTS—**Los Angeles, Calif.**—Nov. 2, by D. P. Nicklin, purch. agt. Dpt. Metropolitan Water & Power, 207 South Bway., furnishing, delivering one hundred 2½ in. single outlet and eighty 2½x4 in. double outlet standard pressure fire hydrants, f.o.b. Ducommun St., Spec. 1538. To exceed $2,000.

POTENTIAL DEVICES COUPLING CAPACITATORS—**Los Angeles, Calif.**—Nov. 8, by D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., furnishing, delivering 25 resonant type potential devices, f.o.b. cars Los Angeles to be used with nominally rated 0.00075 microforad coupling capacitators which are to be installed on 287,000 V. Boulder Canyon Power transmission line, Spec. 1533. To exceed $2,000.

TRAVELING CRANES—**Los Angeles, Calif.**—Nov. 2, by D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., one 100 ton and one 25 ton traveling cranes, both furnished with cut spur tooth type gears, Spec. 1530. To exceed $2,000.

†PLATFORM SCALE, etc.—**New Haven, Conn.**—Nov. 1, by Custodian of Public Buildings, furnishing platform scale and constructing scale pit.

†DIPPER DREDGE, etc.—**Chicago, Ill.**—Nov. 1, by U. S. Engr., 932 Post Office Bldg., furnishing, operating and maintaining 1 dipper dredge and attendant plant.

PUMP—**Marion, Ind.**—Nov. 7, by Bd. Comrs. Grant Co., one 10E condensation pump. C. Kearns, Marion, aud.

COAL MINING MACHINERY, etc.—**Sullivan, Ind.**—White Ash Mine Co., A. Davidson, secy., taking bids coal mine machinery and equipment.

†ENGINE-GENERATOR SET—**Carville, La.**—Nov. 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., installing new engine-generator set at U. S. National Home for Lepers.

†FURNACE STEEL—**Springfield, Mass.**—Oct. 30, by Commanding Officer, Springfield Armory, crucible or electric furnace steel.

TRUCK, etc.—**Moorhead, Minn.**—Nov. 13, by Clay Co., J. C. Atkinson, aud., 5 ton truck and snow plow.

METAL CULVERTS—**Greenville, Miss.**—Nov. 15, by Bd. Supervs. Washington Co., 60 lin.ft. 36 in. metal culverts, delivered at Hollandale; 1,680 lin.ft. creosote piling, 12 pcs. 12x12x22, 12 pcs. 12x12x24 and 6 pcs. 6x14x16 creosote bridge timbers to be delivered to Yerber. H. Dyer, co. clk.

GRAVEL, etc.—**Meridian, Miss.**—Nov. 5, by M. Cameron, clk. Bd. Supervs. Lauderdale Co., Courthouse, 6 months' supply of gravel, pine, bridge lumber and creosoted lumber.

†CABLE, etc.—**Brooklyn, N. Y.**—Nov. 5, by Supply Officer, Army Base, Brooklyn, 33,000 ft. cable and 11 heels for same.

CONTACT SHOES, etc.—**New York, N. Y.**—Oct. 30, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, delivering cast steel contact shoes, cast iron covers, copper bonds, bond wire protectors, and steel bolts for Independent City-owned Rapid Transit System.

GRADER—**North Belle Vernon, Pa.**—Nov. 13, by Boro Clerk, one 1-man power grader, not less than 25 hp. Specifications to be submitted with bid.

NEON TRAFFIC SIGNS—**Phila., Pa.**—Oct. 30, by Dpt. P. Wks., Bureau of Hys., City Hall Annex, neon traffic signs, traffic signal lanterns, signal posts, cable and conduit screenings, asphalt sand and asphalt cement. F. H. Caven, City Hall Annex, dir.

†TURBO-ALTERNATOR — **Phila., Pa.** — Oct. 31, by Yards & Docks, Navy Dpt., Wash., D. C., turbo-alternator, Spec. 7775.

TANKS—**Montreal, Que.**—St. Lawrence Oil Co., Ltd., 1117 St. Catherine St. W., in market three 1,250 gal. gasoline tanks.

LOW BIDDERS

†CEMENT—**Montana**—U. S. Eng., Postal Telegraph Bldg., Kansas City, Mo., Oct. 16, received identical bids 600,000 bbl. cement in bulk and 35,000 bbl. cement in paper bags from five bidders each bidding $2.5054 per bbl. in bulk and $2.7145 per bbl. in paper bags. Est. total $1,598,348. Noted Oct. 4.

CONTRACTS AWARDED

APRON FEEDER—**Los Angeles, Calif.**—S. A. Joseph, purch. agt., Metropolitan Water Dist., 306 West 3rd St., 1 apron feeder for pit rock bin of Wide Canyon concrete plant, Spec. E-124 and drawing B-1510, to Stephens-Adamson Mfg. Co., 2227 East 37th St., $513; 2 vibrating screens, Spec. E-130, to Wordberg Mfg. Co., 417 South Hill St., $2,856. Bids Sept. 29, awarded Oct. 10

AUTO-TRANSFORMERS—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, furnishing, delivering oil-immersed forced air-cooled, outdoor auto-transformers, incl. spare parts and necessary oil, Spec. 3265, to Westinghouse Electric & Mfg. Co., Sharon, Pa., and 420 South San Pedro Rd., $952,000. Bids Jan. 29, awarded Oct. 9.

CONVEYOR BELT—**Los Angeles, Calif.**—A. Joseph, purch. agt., Metropolitan Water Dist., 306 West 3rd St., furnishing 850 lin.ft. conveyor belt, Spec. E-122, 4 lengths 18 in. 198 ft., 225 ft. and 224 ft., furnishing 400 lin.ft. 16 in. conveyor belt, Spec. E-123, 2 lengths 128 ft. and 272 ft., for Colorado River Aqueduct, Bid 28051, to Whitehead Rubber Co., c/o Mechanical Products Co., 516 East 4th St., $2,328. Bids Oct. 1, awarded Oct. 10.

DUMP CARS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 110 dump cars, mine, 70 cu.ft. capacity, Spec. 1504, to Madsen Iron Wks., Box 6a, Huntington Park, $32,280. Bids Sept. 24. Noted Sept. 13.

MUCKING SHOVELS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 6 mucking shovels, electrically driven, Spec. 1513, to Goodman Mfg. Co., 316 East 3rd St., Los Angeles, and 4834 South Halsted St., Chicago, Ill., $51,840. Bids Oct. 1. Noted Sept. 27.

OIL CIRCUIT BREAKERS — **Los Angeles, Calif.**—City, Dpt. Water & Power, 207 South Bway., 138,000 volt oil circuit breakers, Spec. 2982, to Kelman Electric & Mfg. Co., 1650 Naud St., $130,660. Awarded Oct. 9.

PUMPS, etc.—**Oakland, Calif.**—J. W. Kimball, secy. East Bay Municipal Utility Dist., 512 16th St., furnishing, installing 2 centrifugal pumps and motors at Orinda Filter Plant, to United Iron Wks., 580 2nd St., $1,346. Bids Sept. 26.

†REFRIGERATING MACHINERY—**San Diego, Calif.**—Yards & Docks, Navy Dpt., Wash., D. C., replacing refrigerating machinery at Naval Operating Base, Spec. 7792, to West Coast Ice Eng. Co., 312 Market St., $3,299.

LUMBER — **San Francisco, Calif.** — T. A. Brooks, city purch. agt., City Hall, fir and redwood required by city from Oct. 15, 1934, to Jan. 14, 1935, Bid. 1278, to Van Arsdale-Harris Lumber Co., 5th and Brannan Sts., code price less 3%. Bids Oct. 5, awarded Oct. 16.

CABLE—**Hartford, Conn.**—Bd. Contr. & Supply, C. M. Lale, secy., 9,687½ ft. two-conductor Parkway Cable and connections for Brainard Field airport border light system, to Perry Electric Co., 327 Trumbull St., $1,580. Bids Sept. 25, awarded Oct. 16. Other work on this contract FERA labor.

SEWER BRICK—**New Britain, Conn.**—City P. Wks. Dpt., City Hall, 544,000 bricks for East St. job, to Donnelly Brick Co., Swamp Rd., Berlin, $9,248. Awarded Oct. 15.

TRANSMISSION TOWERS—**Chicago, Ill.**—Sanitary Dist. of Chicago, 910 South Michigan Ave., fabricating, delivering 80 ft. steel transmission towers, to Mississippi Valley Structural Steel Co., 20 North Walker Dr., Chicago, $1,040. Awarded Oct. 15.

ASPHALT, etc.—**Oregon, Ill.**—Dpt. P. Wks. & Buildings, Div. Hys., 3,200 gal. asphalt ACB-1 and 21,878 gal. ACB-3, to Standard Oil Co. of Indiana, 910 South Michigan Ave., Chicago, $1,628; 1,500 tons coarse aggregate for retreat surfacing and 790 tons coarse aggregate for repairing base on Sect. 14R-MFT, to C. C. Stephan Ashton, $1,617. Bids Oct. 4.

DIESEL ENGINE—**Estherville, Ia.**—City, 250 hp. diesel engine, to Monroe Electric Co., 228 North LaSalle St., Chicago, Ill., $37,000. Noted Sept. 20.

†CABLE, etc.—**Vicksburg, Miss.**—U. S. Eng. Box 667, 500 lin.ft. 300,000 C.M. electric power cable, to Hazard Insulated Wire Wks., New Orleans, La., $708, bids Oct. 5***3,600 lin.ft. wire rope, to R. Gilmore, C. M. Vallard and D. K. Townsend receivers for Williamsport Wire Rope Co., Williamsport, Pa., $853. Bids Oct. 3***7,765 ft. pipe fitting complete, to Moore Handley Hardware Co., 25 South 20th St., Birmingham, Ala., $656, Bids Oct. 4***50 sections (2,500 lin.ft.) single cotton jacket rubber lined fire hose and 12 sections (600 ft.) steam hose, to Boston Belting & Rubber Corp., 25 Warren St., New York, $1,124. Bids Oct. 4. Grand total $3,341. Noted Sept. 27 and Oct. 4.

†FUEL BURNING UNITS—**Montana**—U. S. Eng., Telegraph Bldg., Kansas City, Mo., fuel oil burning units for derrick boats, to Christenson-Conway Burner Co., 1519 Main St., Kansas City, Mo., $1,525. Bids Oct. 10, awarded Oct. 17.

†FUEL OIL PUMPS—**Montana**—U. S. Eng., Postal Telegraph Bldg., Kansas City, Mo., fuel oil transfer pumps for derrick boats, to Sterling Mchy. Corp., 411 Southwest Blvd., Kansas City, Mo., $149. Bids Oct. 12, awarded Oct. 17.

†PUMPING UNITS—**Montana**—U. S. Eng., Kansas City, Mo., 2 centrifugal pumping units for Fort Peck Dredges at Fort Peck Dam site, to Buffalo Pumps, Inc., 490 Bway., Buffalo, N. Y., $2,661. Bids Oct. 2, awarded Oct. 15.

†STRAND WIRE, etc.—**Bellevue, Neb.**—U. S. Eng., City Natl. Bank Bldg., Omaha, to American Cable Co., Wilkes-Barre, Pa., 192,000 lin.ft. ¼ in. diam. strand wire, $2,696***to Townley Metal & Hardware Co., 200 Walnut St., Kansas City, Mo., 3,600 lb. steel staples ¼ in. wide inside and outside, $209; 1,800 bbl. 10d wire

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†*Federal Government*

Materials, etc. (Continued)

nails in 100 lb. kegs, $65***to Sheffield Steel Corp., Sheffield St., Kansas City, Mo., seven thousand two hundred fifty 18 in. drift bolts, $437; seven thousand two hundred fifty 24 in. drift bolts, $662; 115,000 sq.ft. 9 gage wide wire mesh, $1,553. Grand total $5,622.

†**CONVEYORS — New York, N. Y.** — Treas. Dpt. at office Sup. Archt., Wash., D. C., conveyors, to Robinson-Brannin Co., 90 West Bway., $2,950.

STEEL, etc.—Raleigh, N. C.—Div. Purchase & Contr., A. S. Brower, dir., miscellaneous steel, to Dillon Supply Co., 216 South West St., Raleigh, $2,300***950 road machine blades, to Beach Mfg. Co., Charlotte, $2,569***1 year's requirements of Universal joint discs, to Thermoid Rubber Co., Whitehead Rd., Trenton, N. J. Bids Oct. 16.

PIPE—Mitchell, S. D.—City, 300 tons c.i. pipe, to J. B. Clow & Sons, 201 North Talman Ave., Chicago, Ill. Est. about $10,000.

†**CEMENT—Milwaukee, Wis.**—U. S. Engineers, 4,500 bbl. portland cement for DePere Lock, to Universal Cement Co., 208 South LaSalle St., Chicago, Ill., at $2.42 per bbl.

†**PIPE AND FITTINGS, etc.—Milwaukee, Wis.**—U. S. Forest Service, pipe and fittings, to Central Supply Co., 312 South 3rd St., Minneapolis, Minn., Items (1) $285 (2) $285 (6) $45 (8) $165 (8), $1,549***to Cordes Supply Co., 441 North 2nd St., Milwaukee, Item (4) 158***to March Auto. Irrigation Co., Muskegon, Mich., Item (5) $138***to Whiteshowers, Inc., Detroit, Mich., Item (7) $237 (9) $99 ***snow fence, to Illinois Wire & Mfg. Co., Joliet, Ill., $3,472. Grand total $6,433. Bids Oct. 10.

†**PIPE—Milwaukee, Wis.**—U. S. Eng., 1,187 ft. 9 in. pipe, to Acme Iron & Steel Co., 5329 West State St., $492; power pump, to Aurora Pump Co., Aurora, Ill., $524. Bids Sept. 13, awarded Oct. 10.

SEWER PIPE, etc. — Ottawa, Ont. — City Council, concrete sewer pipe, to Harry Hayley, Hurdsman Rd., $15,847; vacuum pump for waterworks, to General Supply Co. of Canada, Ottawa, $915.

FOREIGN

Australia—Commissioner Dpt. P. Wks., **Adelaide**, bids in December, barrages on River Murray to prevent influx of salt water from ocean, $6,000,000 voted***Nov. 29, by Deputy Minister, Posts & Telegraph Dpt., **Melbourne**, year's supply of telegraph dial parts and dial mechanical tools; Dec. 18, for supplying automatic telephones, switch equipment for use in rural areas***Nov. 19, by State Electrical Comn., **Melbourne**, three 3,000 k.v.a. oil immersed self cooled transformers with spare coils and bushings***Nov. 19, by **Melbourne** City Engineer, 24 ring main switch units incorporating 2 ring main switches and one transformer switch.

Australia, Melbourne—Nov. 21, by Victorian Railway Co., nine 1,500 volt contractors capable of carrying 750 ampere***Nov. 29, by Melbourne & Metropolitan Tramway Bd., traction sub-station units consisting of rotary converter, gears rectifier, steel tank type rectifier and automatic switchgear***Colesseum Treadway Stores, Ltd., P. W. Neville, mgr., bids in December, constructing store, $500,000.

Brazil, Porto Alegre—Nov. 26, by Ferrea do Dio Grande do Sol, 2,000 pointed shovels; 300 coal shovels and 8,000 hack saw blades and 4,500 drill pits.

Chile, Corral—CIA Siderurgicade Valdivia, Corral, Chile, plans steel rolling mills, $2,000,000. Project would be financed by Chilean Govt. subsidy.

China, Pukow—L. Wan, c/o Yung Li Salt Co., Tientsin, China, plans sulphuric acid plant, $500,000 or more.

Cuba—Sigua Manganese Corp., c/o L. Batlle, Santiago, developing manganese deposits at various locations, by day labor. To exceed $100,000. Private plans.

Egypt—Nov. 6, by Ministry of Interior, **Cairo**, for supply d/c motors, control apparatus, cables for Kafr***Nov. 10, by Ports & Lighthouses Administration, **Alexandria** supplying marine engine, marine boiler, grab crane, plates, etc.

Egypt, Cairo—Nov. 10, by Ministry of Communications, 250 tons mild steel plate; 42 tons angles, 12¼ ton cup headed rivets, 4 tons hexagon bolts and nuts***Nov. 29, by Ministry of P. Wks., supplying 82 balances, reversible levels, wall clocks, stop watches and electrically wound clocks.

England—Stockton-on-Tees Educ. Com. bids in November school, $460,000***London Film Products Ltd., **London**, soon takes bids studios construction, $1,500,000***Barnsley** Town Council voted $289,000 for home construction*** **Wallasey** Rural Council awarded contract constructing Brighton Promenade extension, to E. Nuttall & Son, Manchester, $2,548,650*** **Nuneaton** Town Council making plans constructing 4 million gal. reservoir, $133,000*** **Sheffield** City Council, constructing switchroom and turbine home extension, to Mitchell Conveyor Co., $537,900.

England — Swinton and Pendleburg Urban Council, **Swinton**, plans by P. Thomson, Cardiff, town hall, $325,000***St. **Helens** Town Council voted $500,000 for new town hall.

†*Federal Government.*

Greece, Athens — Government constructing flood protection work and drainage scheme in Boetia and Thessaly, to H. Boot & Son Ltd., Sheffield, England, $11,250,000.

India, Bhadravati — Government of Mysore soon takes bids erecting steel plant Rs 21,00,000 of which Rs 2,00,000 will be for electrical equipment.

India, Bombay — Railway Comn., Sir Guthrie Runell, ch. comr., constructing Sind-Bombay Railway. Estimated Rs5¼ crores.

Irish Free State, Castlerea — Government awarded contract for auxiliary mental hospital, to Sisk & Sons, Cork. $700,000.

Persia, Teheran—Nov. 17, by Municipal Engineer, 150,000 cu. metres of paving.

Japan — Japan Manchukwa Aluminium Co., plans plant for manufacturing high grade aluminum, **Toyama**, $500,000***Japan Aluminum Co. plans plant, **Jitsugotsutam**, $2,000,000.

New Zealand, Wellington—Nov. 16, by Director of General Posts & Telegraph Dpt., supplying 200 cells, secondary, 2 volt, 4 ampere hrs. complete with accessories.

Scotland—Blyth & Blyth, engrs., Edinburgh, making plans road bridge and approaches, **Port Edgar**, $20,000,000***Leith Dock Comn., **Leith**, T. Cowanin, chn., plans widening pier entrance and extending pier head, and constructing deep water quay, $2,500,000.

Siam, Bangkok—Dec. 18, by Royal State Railways of Siam, supply of steel railway bridges and in market for 200 pcs. buffing springs and 400 pcs. draw springs.

South Africa—Empire Trade Building Ltd. plans 12 story building, **Johannesburg**, $1,000,000 O. K. Bazaars (1929) Ltd. soon takes bids store and office building, **Port Elizabeth**, $500,000 ***O. K. Bazaars (1929) Ltd., bids in November stores and office building, **East London**, $300,000.

South Africa—Nov. 26, by T. H. Watermeyer, chn., South African Railways & Harbor Administration, **Johannesburg**, supplying water softening plant; Nov. 12, for supply 69,500 ft. train lighting belting, india rubber impregnated 2½ in. 4 ply***R. B. H. McNab, city clk., **Capetown**, wants prices for supplying five hundred 6 in. spun iron pipes***P. Colesky, **Alexandria**, want prices concrete road rollers, 7 tons fitted with tractor hitch.

Union Socialist Soviet Republics—Automobile Combine, c/o Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, truck and automobile assembly plant, 30,000 cars annual capacity, by day labor about Mar. 1. To exceed $1,000,000.

Union Socialist Soviet Republics—Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing new steel mill at Bakal, Ural Region, by day labor. To exceed $5,000,000.

Union Socialist Soviet Republics—Division Musical Instruments, Commissariat of Light Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, phonograph manufacturing plant, 600,000 machines annual capacity, at Vladimirov, by day labor. $500,000 or more.

Union Socialist Soviet Republics—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, steel, concrete sports stadium in Cheliabinsk, Ural Dist., by day labor. Est. about $500,000.

Wales—Swansea City Engineer in market for supply of auxiliary switchgear, $170,000*** **Rhodda** Urban Council voted $295,000 for sewage works $295,000***Aberystwyth** Rural Council voted $270,000 for water supply works.

DETAILS OF PWA NON-FEDERAL ALLOTMENTS

Loans and Grants Except as Noted.

*Grant. †Loan.

KEY TO SYMBOLS

m-meters	**c**-canal
p-pump	**dm**-dam
t-tank or standpipe	**r**-reservoir
f-filtration	**tr**-treatment plant
d-distr. supt.	**b**-building
w-well	**i**-iron removal
s-supply	**pw**-power line
g-generator	**sf**-softening
ch-chlorinators	**bl**-boilers

Waterworks

*Amsterdam, N. Y., **f**	$83,000
Hardy, Ark., **s-p-f-t-d**	33,000
Lovelady, Tex., **w-p-t-d**	24,000
Olney, Tex.—pumps—chemical equipment—chlorination—settling tank—dist. supt.	133,000
Steamboat Springs, Colo.	12,500
Stockdale, Tex. (complete system)	34,000
Williams Bay, Wis.	75,000

Sewers

*Mendota, Wis.	12,800
*Steamboat Springs, Colo.	2,500

Sewage Disposal Plants

Hays, Kan.	65,000

Sewers and Disposal Plants

Chestertown, Md.	44,000
Federalsburg, Md.	38,000

Bridges

Escanaba, Mich.	2,600

Street or Road Construction

Clayton, Del.	8,000
*East Haven, Conn.	23,200
Louisville, Ky.	3,092,700
*Madison County, Ill.	335,000
Montgomery Co., Md.	173,000
Newtown, Conn.	94,500

Buildings

Canyon, Tex. (dormitory)	47,000
*Catonsville, Md. (hospital)	39,500
Decatur, Tex. (court house)	16,500
Montgomery County, Md. (fire house)	20,000
New York, N. Y. (fire pumping station, high pressure)	503,000
New York, N. Y. (pavilion of City Hospital)	78,000
Poplar Bluff, Mo. (auditorium and community building)	148,000
State of Wyoming (three institutions)	270,000
*Wilmington, Del. (pump house and fire pump)	17,500

Schools

Ada, Okla.	58,400
*Baltimore County, Md.	48,000
*Berkeley, Calif.	228,000
Carter County, Okla.	3,000
*Dundee, Ky.	3,400
*Morgan County, Colo.	3,500
New York, N. Y. (159th Ave. 98th-99th, Howard Beach, Queens)	548,000
Riley County, Kan.	10,100
Scarville, Iowa	25,000

Miscellaneous

*Pottawatomie Co., Okla. (school bus)	300
*Wilmington, Del. (park improvements)	43,000

PUBLIC BUILDINGS

PROPOSED WORK

Ala., Gadsden—City, c/o Mayor, soon takes bids rein.-con., brick community and recreation building. P.W.A. allotted $136,000. P. W. Hofferbert, Gadsden, engr.

Calif., Camarillo—State Dpt. P. Wks., Div. Architecture, P. Wks. Bldg., Sacramento, rejected bids boiler plant at State Hospital, $50,000 or more. New bids will be asked for above and additional units. Noted Sept. 6.

Calif., Los Angeles—Los Angeles Bd. Educ., sketches by Austin & Ashley, 608 Chamber of Commerce Bldg., rehabilitating reconstructing, strengthening main building, classroom annex, cafeteria, domestic science, mechanical arts, and science buildings, at John Muir Junior High School, 5929 South Vermont Ave., $181,665.

Calif., Montebello—Montebello School Dist. plans election to vote issue to provide funds for construction of high and elementary schools, $900,000. T. C. Kistner, 814 Architects Bldg., Los Angeles, archt.

Calif., Redwood City—San Mateo Co., election Nov. 6, $115,000 for 4 story, rein.-con. office courthouse annex. W. H. Toepke, 74 New Montgomery St., San Francisco, and E. L. Norberg, 407 Occidental Ave., Burlingame, archts. Noted Sept. 6.

Calif., San Jose—Santa Clara Co., election Nov. 6, $250,000 county hospital wing. Sketches made by Binder & Curtis, 35 West San Carlos St. Noted Nov. 23.

Calif., West Los Angeles (br. Los Angeles)—Los Angeles Bd. Educ. sketches by C. Beelman, 1019 Union Bank Bldg., Los Angeles, reconstructing, rehabilitating, strengthening University High School, 11,860 Texas Ave., $122,485. P. E. Jeffers, 816 West 5th St., Los Angeles, engr.

†**Conn., Bistol**—Treas. Dpt. at office Sup. Archt., Wash., D. C., brick, stone U. S. Post Office, Malone Court, $91,000. Bids Oct. 26 for clearing site. L. B. Scheide, 36 Pearl St., Hartford, archt. Noted Mar. 8.

Conn., Glastonbury—State, Legislative Comn. on Jails, Prof. J. Davis, chn. Yale University, New Haven, recommends State purchase 500 acres here on Connecticut River for jail and prison farm site, construction of which was proposed 1933 Legislature. To exceed $150,000. Architect not appointed.

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Public Buildings (Continued)

Conn., Kent—State, State Park & Forest Comn., Hartford, sketches state museum, $160,000. Will house Reginald Brasher collection of bird drawings and other things. Plan Federal aid.

†**Illinois**—Federal Subsistence Homesteads Div., Chicago, plans by R. Powers, 6 North Michigan Ave., Chicago, constructing fifty 1 story homes each with 10 acre tract on Route 41W between Waukegan and Lake Zurich, $150,000. E. L. Middleton, 308 U. S. Court Bldg., Chicago, engr.

Ill., Chicago—Bd. Educ. plans by J. P. Christensen, 121 North LaSalle St., 3 story, basement, 30 room school, 74th and Cornelia Sts. $250,000.

Ind., Crown Point—Bd. Comrs. Lake Co., plans improving county buildings, incl. plumbing, electric fixtures, heating system, $21,000 appropriated. J. E. Finerty, aud.

Ind., Griffith—School Trustees, P. J. Beiriger, trustee, Lake Co., plans installing ventilating system, plumbing and electric fixtures in school.

Ind., Wabash—Bd. Comrs. Wabash Co., making plans new heating plant for hospital. C. Wright, aud.

Ia., Ames—Independent School Dist. defeated $100,000 bonds for Junior High School building and $100,000 bonds for Senior High School building. Noted Aug. 30.

Ia., Waterloo—City, election Nov. 20, $199,500, for constructing city hall and auditorium; $35,000-$40,000, for stadium and park improvements. P.W.A. allotted grant and loan.

Kan., Goodland—Bd. Educ., E. J. Beckner, secy., for Sherman Community High School, 2 story, basement, brick, concrete. P.W.A. rescinded $175,000 loan and grant. Mann & Co., 721-22 Rorabaugh-Wiley Bldg., Hutchinson, archts.

†**Me., Augusta**—U. S. Property & Disbursing Officer, State House, Augusta, plans by Bunker & Savage, 256 Water St., storage shed, incl. heating, plumbing, electrical work.

†**Md., Beltsville**—Bureau Purchases, Sales & Traffic, making plans 160 residences for employed for U. S. Experimental Farm.

Mass., Maynard—Town, D. Lent, secy. Bd. Selectmen, article in Town Warrant to be acted on at special town meeting Oct. 15 to appoint committee to consider feasibility of municipal electric light plant construction.

Mass., Monterey—Town, C. H. Miller, supt. schools, sketches by G. H. Nichols, 93 State St., Albany, N. Y., brick, steel school, $105,000. Site not selected.

Mass., Taunton—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, rejected bids hospital buildings at State Hospital. Kentall, Taylor & Co., 209 Columbus Ave., Boston, archts. R. D. Kimball Co., 6 Beacon St., Boston, engrs.

†**Mass., Wakefield**—Treas. Dpt. at office Sup. Archt., Wash., D. C., brick, stone U. S. Post Office, Yale Ave. and Main St. $115,000. Bids Oct. 30 for clearing site. E. M. Bridge, 118 Salem St., archt. Noted Mar. 2, 1933.

Mass., Worcester—City, R. Earle, pres. Worcester Polytechnic Institute & chn. of Directors of New Library Com., taking competitive bids for architect (limited to Worcester architects) to be opened Dec. 15, for public library at Worcester Polytechnic Institute with passenger and freight elevator service, $750,000.

Mass., Worcester—Worcester City Hospital, C. Anderson, chn. Bd. Trustees, bids early in November brick, steel ward, surgical and obstetrical units, also laboratory, $600,000. Stevens, Curtin & Mason, 45 Newbury St., Boston, archts. G. Adolph Johnson, 16 Norwich archt.

Mich., Greenville—Municipality plans light and power plant alterations, $30,000 or more. Francis Eng. Co., Saginaw, engrs.

Mich., Morenci—Village, election Nov. 10, $146,000 bonds to secure P.W.A. loan and grant to construct municipal electric light and power plant and distribution system. G. C. Daily, Morenci, engr. Noted Aug. 30.

Mo., Hillsboro—Jefferson Co. defeated $175,000 bonds for constructing 2 story, basement, rein.-con., brick, stone court house, $275,000. Bonsack & Pearce, Inc., 411 Olive St., St. Louis, archts. Noted July 19.

Mo., Marshall—City plans improving light plant and distribution system. Burns & McDonnell Eng. Co., 107 North Linwood Blvd., Kansas City, engrs.

Mont., Missoula—Bd. Educ. voted bonds to secure $147,000 P.W.A. loan for rebuilding Central Grade School and enlarging and remodeling Lowell School, H. E. Kirkemo, Missoula, archt. Noted Sept. 20 Daily.

†**Neb., Grand Island**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Sept. 14, 2 story, basement, 54x63 ft. steel, concrete, stone U. S. Post Office and Court House. Noted Aug. 30.

N. J., Penns Grove—School Dist. of Penns Grove and Penns Neck, Salem Co., rejected bids Sept. 27, constructing school. P.W.A. project. Noted Sept. 27.

†**N. Y., Ballston Spa**—Treas. Dpt. at office Sup. Archt., Wash., D. C., made plans and soon takes bids U. S. Post Office, $62,700.

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N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, plans by C. B. Meyers, 31 Union Sq., New York, constructing out-patient building at Greenpoint Hospital, Kingsland Ave. $306,000 allotted by P.W.A.

†**N. Y., Catskill**—Treas. Dpt. at office Sup. Archt., Wash., D. C., revised plans completed and soon takes bids brick, steel U. S. Post Office plain found., $68,900. Noted Dec. 14, 1933.

N. Y., Churchville—Bd. Educ., Town of Riga, plans by C. C. Ade, 80 East Ave., Rochester, school, $185,000 allotted by P.W.A.

†**N. Y., Cobleskill**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Sept. 28, constructing U. S. Post Office. Noted Sept. 13.

N. Y., Dongan Hills—Dpt. Hospitals, Municipal Bldg., plans repairing retaining wall, installing electric power lines, electric transformers at Farm Colony. To exceed $17,000. **Maturity at once.** P.W.A. funds allotted. L. Ortner, c/o owner, engr.

N. Y., Eastchester—Bd. Educ. soon takes bids constructing Fennimore Cooper School, $100,000, $75,000 allotted by P.W.A., A. Weggeman, 44 Grand Blvd., Scarsdale, archt., Voorhees, Gmelin & Walker, 101 Park Ave., New York, assoc. archts.; also Maple Street School, $120,000, P.W.A. funds allotted, Starrett & Van Vleck, 207 5th Ave., New York, archts.

N. Y., Interlaken—Central School Dist. 4 soon takes bids school, $188,000. Bley & Lyman, Delaware St., Buffalo, archts.

†**N. Y., Ithaca**—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids brick, steel U. S. Post Office, plain found. $129,500.

†**N. Y., Massena**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans nearing completion U. S. Post Office. $60,500.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., soon takes bids altering and fire prevention work at Metropolitan Hospital, Welfare Island. To exceed $100,000. P.W.A. allotted funds. C. B. Meyers, 31 Union Sq., New York, archt.

N. Y., New York—Bd. Higher Educ., Hunter College, soon takes bids electric fixtures for gymnasium building, at Hunter College, $65,800. P.W.A. funds allotted. Thompson, Holmes & Converse, 101 Park Ave., archts., and C. B. Myers, 31 Union Sq., consult. archt.

N. Y., New York—Dpt. Hospital, Municipal Bldg., soon takes bids altering hospital, fire prevention work, at Bellevue Hospital, foot East 26th St. To exceed $100,000. P.W.A. loan granted. C. B. Meyers, 31 Union Sq., archt.

N. Y., Schenectady—Bd. Health, F. J. McDonald, comr., plans by H. Phillips, c/o Bureau of Buildings, Boro Hall, health center, $167,000 allotted by P.W.A. Noted June 7.

N. Y., Walton—Bd. Educ. plans by Conrad & Cummings, 99 Collier St., Binghamton, 2 story, basement, brick, steel school, plain found. $145,000. P.W.A. project. W. W. Chapin, 153 East 38th St., New York, engr. Noted Mar. 29.

N. Y., Yonkers—City plans new boilers for fire house. $9,000. P.W.A. allotted funds. C. J. Sheridan, city engr.

Okla., Enid—City election Nov. 6, to vote bonds constructing Junior High School, $151,000. R. W. Shaw, Enid, engr. Noted July 21.

Tex., Commerce—S. H. Whitley, pres. East State Teachers College, 2 story, brick, stone, concrete dormitory, $123,000. Allotment approved by P.W.A. W. E. Ketchum, Pope Bldg., Austin, archt.

Tex., Huntsville—Dr. Estell, pres. State Teachers College, plans nearing completion by W. E. Ketchum, 209 East Milton St., Austin, 4 story, brick, hollow tile, cement, rein.-con. dormitory, $160,000.

†**Tex., Shamrock**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Sept. 24, 1 story U. S. Post Office. $50,700. Noted Sept. 6.

Tex., Terrell—Bd. Control, c/o C. Teer, chn., Austin, plans by A. E. Thomas, Constr. Bldg., Dallas, 2 story, rein.-con., hollow tile, terrazzo dormitory at Terrell State Hospital. $110,000.

Utah, Ogden—Weber Co. School Dist., election Nov. 21, to vote on bonds to secure P.W.A. loan to construct school, $200,000. M. C. Wood, Eccles Bldg., Ogden, archt. Noted Sept. 27.

BIDS ASKED

Ala., Troy—Nov. 15, by S. Copeland, mayor, at office of City Clerk, gas mixing and storage plant and gas distribution system requiring 1 Butane-Air gas mixing plant 10,000 c.f.h. maximum output; 1 liquid storage tank, 2,183 cu. ft. capacity; 1 gas storage tank, 3,730 cu.ft. capacity; 58,161 ft. 2- to 4-in. c.i. mains, 40,420 ft. 4- to 14-in. galvanized steel services, 470 gas meters and regulators. C. A. McKeand & Associates, Troy, engrs.

†**Calif., San Rafael**—Nov. 6, by Treas. Dpt. at office Sup. Archt., Wash., D. C., clearing site for construction U. S. Post Office.

†**D. C., Wash.**—Nov. 1, by Treas. Dpt. at office Sup. Archt., Wash., D. C., millwork for Department of Labor and Interstate Commerce Commission building.

Indiana—Oct. 30, by State Hy. Comn., Indianapolis, constructing concrete, brick, steel, service station and district garage, at Vincennes; 2 standard district garages, one at Crawfordsville, and other at LaPorte, all brick, concrete, steel, J. A. Adams, chn.

Md., Cumberland—Bd. School Comm., Allegany Co., Court House, bids about Nov. 1, 3 story, basement school, $750,000. P.W.A. project. R. Holt Hutchins, Cumberland, engr.

†**Mich., St. Johns**—Nov. 6, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel, stone, rein.-con post office. Noted Mar. 23, 1933.

†**Miss., Meridian**—Oct. 31, by Dpt. Interior, Div. Subsistence Homesteads, constructing 25 houses and outbuildings for federal homestead project. Krouse & Brasefield, Meridian, archts.

†**Mo., St. Louis**—Nov. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairing roof, pointing stonework for U. S. Custom House, 8th and Olive Sts.

†**Mont., Browning**—Nov. 18, by Dpt. Indian Affairs, Wash., D. C., 1 story, basement, brick, tile hospital, plain found., $172,500. Schmidt, Garden & Erickson, 104 South Michigan Ave., Chicago, Ill., archts. Noted July 12.

†**Mont., Hamilton**—Nov. 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator in animal house laboratory.

†**N. J., Atlantic City**—Nov. 1, by Treas. Dpt. at office Sup. Archt., Wash., D. C., clearing site for U. S. Post Office. Noted Aug. 16.

N. Y., Beacon—Nov. 13, by Commissioner Correction, State Office Bldg., Albany, refrigeration work, storehouse, at Matteawan State Hospital.

N. Y., Buffalo—Nov. 8, by Municipality, Commissioner P. Wks., City Hall, general contract, heating and ventilating, plumbing and drainage, electrical work and cell work, for police headquarters. $500,000. Noted July 20.

N. Y., Coxsackie—Nov. 8, by Commissioner Correction, State Office Bldg., Albany, constructing, heating, sanitary and electrical work for remodeling Collier house at New York State Vocational School.

N. Y., Creedmoor—Nov. 14, by Dpt. Mental Hygiene, State Office Bldg., Albany, construction, heating, sanitary and electrical work, lighting fixtures for assembly hall and service connections for Brooklyn State Hospital, Creedmoor Div. Noted Sept. 27.

N. Y., Dannemora—Nov. 13, by Commissioner Correction, State Office Bldg., Albany, heating work, sanitary work, and kitchen equipment for kitchen and mess hall, Clinton Prison.

N. Y., Dannemora—Nov. 20, by Commissioner Correction, State Office Bldg., Albany, completing heating work, kitchen, mess hall, shop and school buildings and service connections at Clinton Prison.

†**N. Y., Ithaca**—Nov. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office. Noted Oct. 18.

N. Y., Woodbourne—Nov. 13, by Dpt. Correction, State Office Bldg., Albany, heating, sanitary work and equipment, kitchen equipment for mess hall building at Woodbourne Institution, for Defective Delinquents.

N. Y., Napanoch—Nov. 15, by Commissioner Dpt. Correction, State Office Bldg., Albany, constructing, heating, sanitary and electric work for cannery and altering administration section of main building and service connections, at Institution for Male Defective Delinquents.

N. Y., Pine Aire Station—Nov. 14 (extended date), by Dpt. Mental Hygiene, State Office Bldg., assembly hall, power house and service connections, at Pilgrim State Hospital. Noted Sept. 27.

N. Y., Pine Aire Station—Nov. 21 (extended date), by Dpt. Mental Hygiene, State Office Bldg., Albany, construction, heating, sanitary and electrical work, etc., for Farm Colony Buildings 76 and Single Cottages Buildings 77, 78 and 79, Pilgrim State Hospital. Noted Sept. 27.

†**N. Y., Rosebank**—Oct. 28, by Treas. Dpt. at office Sup. Archt., Wash., D. C., new buildings for U. S. Quarantine Station, at Rosebank. Noted Oct. 11.

Okla., Blackwell—Nov. 1, by City, G. Kuepfelk., high school, $220,000. P.W.A. project. L. J. Shumway, Tulsa, engr. Noted Apr. 26.

†**Tex., McAllen**—Nov. 16, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 story, brick, steel post office, $63,300. Noted Feb. 15.

†**Wash., Almira**—Nov. 8, by Bureau Reclamation, Dpt. Interior, Almira, constructing fourteen 3-room and sixteen 4-room residences at Government Camp at Grand Coulee Dam, Columbia Basin Project, Spec. 599.

Wash., Seattle—Nov. 8, by Bd. P. Wks., furnishing control and instrument switchboards, frequency and load control equipment for Diablo Power House for Skagit hydro-electric development, $35,000-$45,000. Bd. taking bids 413,000 lb. structural steel for Diablo transmission line towers.

†**W. Va., Princeton**—Nov. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing superstructure U. S. Post Office. Rejected July 18 bids. Noted July 12.

†**Canal Zone**—Nov. 20, by Governor of Panama Canal, Balboa Heights, constructing twenty-five 2-family, concrete, wood quarters, 16-room bachelor apartment building at Gatun; two 1-family concrete, wood cottages at Ancon, and 1 oil and paint storehouse, at Mount Hope.

†*Federal Government.*

Public Buildings (Continued)

CONTRACTS AWARDED

Calif., San Jose—City Council, C. B. Goodwin, mgr., general contract civic auditorium, to C. A. Thomas, 127 Clayton Ave., $314,000***plumbing, to A. J. Peters, 455 Washington St., $11,623***electrical work, to Guilbert Bros., 286 West Santa Clara St., $17,750***mechanical work, to Hately & Hately, 1710 10th St., Sacramento, $12,393. Grand total $385,166. **P.W.A.** Bids Oct. 8, awarded Oct. 16. Noted Sept. 27.

Conn., Lisbon—State, State Hy. Dpt., Hartford, 2 story, 50x100 ft., 1 story, 20x25 ft., brick, steel, concrete office and boiler plant. $105,000. Owner builds.

†**Conn., Waterbury**—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing special lighting fixtures for interior of U. S. Post Office, to Franklin-Starrett Co., Wash., D. C., $1,546. Bids Oct. 11.

D. C., Wash.—District Comrs., District Bldg., constructing Anacostia Junior High School, to C. H. Tompkins Co., 1608 K St. N.W., $388,-10. (**Correction**—contractors name and address.) Noted Sept. 13, under "Contracts Awarded."

†**Fla., Leesburg**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to A. C. Atherton, Evanston, Ill., $37,-800. Bids Sept. 18. Noted Sept. 6.

†**Ill., Carthage**—Treas. Dpt. at office Sup. Archt., Wash., D. C., general contract 1 story, basement, 56x60 ft., brick, steel post office, to C. Westberg & Co., 6234 South Oakley Ave., Chicago, $38,890. Bids Sept. 18. Noted Sept. 6.

†**Ill., Fulton**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to P. E. Kornman, Sterling, $38,350. Bids Aug. 31. Noted Aug. 9.

Ill., Highland—Kellerman Contg. Co., general contractors, 625 North Euclid Ave., St. Louis, Mo., excavating for high and grade school, to Stoker Gravel & Constr. Co., Highland***gypsum roof, to U. S. Gypsum Co., 317 North 11th St., St. Louis, Mo.***hardware, to Shapleigh Hardware Co., 315 Washington Ave., St. Louis, Mo.***millwork, to Drapers Granite City Planing Mill Co., Granite City***sheet metal work, to Belleville Sheet Metal Wks., 820 West A St., Belleville***structural steel, to Banner Iron Wks., 4560 Shaw Ave., St. Louis, Mo.***terrazzo work, to Roman & Co., 7018 South Ashland Ave., Chicago, for Bd. Educ. School Dist. 15. **P.W.A.** Noted Oct. 11, under "Contracts Awarded."

†**Ill., Normal** — Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. L. Simmons Co., Inc., Bloomington, $35,000. Bids Sept. 27. Noted Sept. 6.

†**Ill., Pittsfield**—Twenty-First Forestry Dist., Jefferson Barracks, Mo., general contract 1 barracks building at Camp Pittsfield, to R. E. Jones, 2337 South 5th St., Springfield. Bids Oct. 15.

Ind., Rensselaer—Jasper Co., K. L. Allman, aud., heating plant, incl. 2 stokers at court house, to Paragon Stoker Co., Fowler. Est. $17,750.

†**Mass., Boston**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing medical officers double house, etc., at U. S. Marine Hospital, to J. J. Brock, 123 Cambridge St., Charleston, $24,710. Bids Sept. 24. Noted Sept. 6.

Mass., Concord—Commonwealth of Massachusetts, M. J. Dee, supt. of Reformatory, removing tower, installing plumbing, electrical work and sprinklers, State Project 17, P.W.A. Docket 4056, at Massachusetts Reformatory at West Concord, to C. A. Dodge, 2 Erie St., Cambridge, $24,265. **P.W.A.** Bids Sept. 27, awarded Oct. 17. Noted Sept. 20.

†**Mass., Dedham**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. A. Munroe, North Attleboro, $39,-900. Bids Oct. 9. Noted Sept. 27.

Mo., St. Louis—Bd. Educ., 911 Locust St., general contract Peter Herzog School, 2 story, basement, 72x168 ft., rein.-con., brick, 5835 Pamphlin Ave., to M. I. Fleischer-Fleischer Investment & Constr. Co., 1714 Railway Exch. Bldg., $205,000. Bids Oct. 3. **P.W.A.** Noted Sept. 27.

†**Mo., St. Louis**—Treas. Dpt. at office Sup. Archt., Wash., D. C., excavation and foundations for U. S. Post Office, to Fruin Colnon Co., 502 Merchants LaClede Bldg., $306,500. Bids Oct. 8. Noted Sept. 27.

Mo., St. Louis—John Hill Constr. Co., general contractors, Syndicate Trust Bldg., excavating for 3 story, 34x56 ft. east and west wing additions for Columbia School, to A. P. Nolan, 1419 Michigan Ave.***concrete and cement work, to H. A. Dailey, Inc., 4108 Clayton Ave.***miscellaneous iron and steel, to Mississippi Valley Structural Steel Co., 3117 Big Bend Blvd., Maplewood***plumbing, to W. L. Clucas & Co., 11 North Grand Blvd.***W. McDonald Constr. Co., general contractors, 3929 West Pine Blvd., damproofing 3 story, 34x91 ft. addition for Gundlach School, to Swift Roofing Co., 3929 West Pine St.***concrete and cement work, to H. A. Dailey, Inc., 4108 Clayton St.***cut stone, to Steven & Son, 119 Miller St.***brick work, to Reinschmidt Bricklaying Co., 1615 Prather St.***iron and steel, to Columbia Iron Wks., Inc., 4254 Vista Ave.***sheet metal work, to Lucas Steel Metal & Furnace Co., 6255 St. Louis Ave.***tile roofing, to Fitzgerold-Roberts Roofing Co., 7269 Maryland St.***plumbing, to A. G. Maass Plumbing Co., 2824 Cherokee St.*** heating and ventilating, to Eichler Heating Co., 2125 Locust St.***electrical wiring, to Hesse Schaeffer Electric Co., Inc., 921 Baden Ave., for Bd. Educ., 911 Locust St. **P.W.A.** Noted Oct. 4, under "Contracts Awarded."

†**N. J., Hackettstown**—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to Bergen Essex Constr. Co., Belleville, $34,550. Bids Aug. 31. Noted Aug. 9.

N. J., Rumson—Bd. Educ., general contract school, to Ehret Day Co., Asbury Park, $120,-145***structural steel, to Maxwell Spiro & Co., 241 Communipaw Ave., Jersey City, $7,465*** heating and ventilating, to F. P. Farrell, 269 Camden St., Newark, $16,053***plumbing, to G. W. Stillwell, 102 Market St., Perth Amboy, $8,897***electrical work, to A. N. Meister, 401 South 15th St., Newark, $8,246. Grand total $160,806. **P.W.A.** Bids Sept. 28. Noted Sept. 20 Daily.

†**N. M., Carlsbad**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to W. McDonald Constr. Co., 3829 West Pine Blvd., St. Louis, Mo., $58,383. Bids July 26. Noted July 12.

N. Y., East Rockaway—Bd. Educ., general contract school, to Andrew Weston, Woodmere, $177,900. **P.W.A.** Bids Oct. 2. Noted Sept. 27.

N. Y., Lawrence—Bd. Educ., heating for high school, to D. J. Rice, Inc., 41-50 38th St., Long Island City, $72,370***plumbing, to H. Barrow Co., $24,465***electrical work, to Arc Electric Co., 405 Lexington Ave., New York, $42,420. Grand total $139,255. Noted Oct. 11, under "Contracts Awarded."

N. Y., Oneonta—Dpt. Health, State Office Bldg., Albany, nurses call signal system, to Langdon & Hughes, 246 Elizabeth St., Utica, $8,879. Noted Sept. 6.

†**N. Y., Watkins Glen**—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to Agostini Bros., 205 East 42nd St., New York, $33,650. Bids Sept. 28. Noted Sept. 13.

†**N. D., Oakes**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to McGough Bros., 1954 University Ave., St. Paul, Minn., $34,800. Bids Oct. 1. Noted Sept. 13.

O., Cincinnati — Hamilton Co. Tuberculosis Comn., Court House, general contract 1 story, basement, occupational therapy building addition, plain found., to J. E. Warm Co., 2335 Florence St., $107,265***electrical work, to Frees Electrical Co., 622 Bway., $10,150*** heating, to T. J. Conner, Inc., 3290 Spring Grove Ave., $9,773***ventilating, to W. D. Callan Co., 3919 Main St., $2,835***plumbing and refrigeration, to James J. Dowd Co., Cincinnati, $8,100***pipe covering and insulation, to Mundet Cork Corp., 119 Sycamore St., $2,389. Grand total $140,512. **P.W.A.** Bids Oct. 8, awarded Sept. 15. Noted Sept. 20.

O., Hillsboro—Bd. Educ., E. E. Holt, supt., 3 story, basement, brick, concrete, steel school, plain found., Main St., to P. W. Johnson, Hillsboro, $124,961. **P.W.A.** Bids June 25. Noted June 14.

†**Okla., Cushing**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Murch Bros. Constr. Co., 4111 Lindell Blvd., St. Louis, Mo., $37,901. Bids Oct. 9. Noted Sept. 20.

†**Pa., Middletown**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to S. Plato, Middletown, $28,750. Bids Aug. 31. Noted Aug. 9.

Tenn., Memphis—At office D. C. Miller, city clk., Court House, John Gaston Memorial Hospital, Madison St., near Dunlap St., general contract, to S. & W. Constr. Co., Shrine Bldg., $429,944***plumbing and heating and ventilating, to C. Wallace Plumbing Co., 2224 Summer St., Dallas, Tex., $49,840 and $58,560 respectively***electrical work, to Shelby Electric Co., Inc., 112 East Iowa St., $39,400***elevators, to Otis Elevator Co., 248 Court St., $35,315*** kitchen equipment, to Southern Equipment Co., 5017 South 38th St., St. Louis, Mo., $16,650. Grand total $629,709. Noted Sept. 13.

Wash., Seattle—Bd. P. Wks., constructing Diablo Powerhouse, incl. bridge, tailrace, concrete generator pedestals, combination transformer and switch platform etc. in connection with Skagit Hydro-electric development, to Rumsey Constr. Co., 3821 Airport Way, $339,010. Bids Oct. 16.

Wis., Shorewood—School Bd. Dist. 4, general contract 2 story, basement, 117x193 ft., brick, steel auditorium, North Oakland St., to Hunzinger Constr. Co., 1827 North 30th St., $194,-912***electrical work, to Urhlein Electric Co., 514 Ogden St., (A) $10,189 (B) $8,749 (C) $859***plumbing, to Wenzel & Henoch Co., 1524 North 27th St., $7,774***heating, to Wenzel & Henoch Co., 1524 North 27th St., $24,733. Grand total $247,216. **P.W.A.** Noted Sept. 20.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Palo Alto—University of Stanford sketches by J. Bakewell & A. Brown, Jr., 251 Kearny St., San Francisco, Class "A" rein.-con., steel theatre and war memorial, University Campus. To exceed $115,000.

Conn., Bridgeport—National Greyhound Lines, 54 West 51st St., New York, deferred taking bids on general contract until about Dec. 1, for hotel. Francisco & Jacobus, 511 5th Ave., New York, archts. Noted Sept. 20.

Conn., New Britain—Immaculate Conception Parish, Rev. L. Bojnowski, New Britain, sketches by L. A. Walsh, 69 Center St., Waterbury, brick, stone novitiate, Orange St. Est. about $105,000.

Mass., Brockton—Enterprise Dpt. Stores, S. Glass, mgr., 160 School St., Everett, sketches by J. Williams Beal Sons, 185 Devonshire St., Boston, 1 story, basement, 160x200 ft., brick, concrete, steel department store and warehouse, Main St.

Mass., Dedham—St. Mary's Roman Catholic Church, revised plans by E. A. Hubbard, Eliot St., South Natick, 2 story, basement, 76x225 ft., brick, stone, granite parochial school, concrete found., High St. To exceed $115,000.

N. Y., Bath—Bath Memorial Hospital Bd., plans by C. S. Barrows, 56 James St., Rochester, steel hospital, plain found. To exceed $105,000. Seeking P.W.A. loan.

N. Y., Brooklyn—South Brooklyn Savings Bank, Atlantic Ave. and Court St., will not build apartment, Ridge Blvd. and 76th St. $200,000. Project abandoned. C. A. Holmes, 15 East 38th St., archt. Noted Sept. 27.

N. Y., Brooklyn—Piermont Contg. Co., 16 Court St., plans by Seaberg Elevator Co., 427 Douglas St., elevators and mechanical equipment alterations in 6 story, store and office buildings, Montgomery and Pierrepont and Hicks Sts. Est. about $28,000.

N. Y., Brooklyn—Broadway Savings Bank, 5 Park Pl., New York, plans by G. Platt & Bro., 221 West 57th St., New York, altering heating and plumbing in 5 story apartment, State St. near Bond St. To exceed $28,000.

N. Y., Brooklyn—Caton Towers Co., 191 Joralemon St., plans by W. McCarthy, 147 Pierrepont St., 6 story, brick apartment, Caton Ave. and Church St. $130,000.

N. Y., Brooklyn—Five Hundred One Avenue R Corp., 5321 18th Ave., plans by Cohn Bros., 191 Joralemon St., 6 story, brick apartment, Avenue R and East 5th St. $105,000.

N. Y., Brooklyn—Lebern Builders, Inc., 26 Court St., plans by Cohn Bros., 191 Joralemon St., 6 story, 94x170 ft., brick apartment, Shore Rd. and 97th St. $275,000.

N. Y., Harrison—Meuer & Auerbach, Inc., 99 Mamaroneck Ave., White Plains, plans 1 and 2 story, brick, frame dwellings and tract development, Spencer Glenn St. To exceed $100,-000.

N. Y., New York—Grand Concourse Corp., 250 West 57th St., plans by J. M. Felson, 250 West 57th St., New York, 6 story, brick apartment house, 182nd St. and Grand Concourse, $175,-000. **Maturity after Nov. 1.**

N. Y., New York—Astor Theatre Realty Co., 1531 Bway., bids late in November, altering, brick, steel, concrete theatre, 1531 Bway., $150,-000. T. W. Lamb, 701 7th Ave., archt. Noted Aug. 30.

N. Y., New York—Columbus Hospital bids late in October, hospital addition, Edgecombe Ave. and 163rd St. DePace & Juster, 151 West 46th St., archts. Noted Oct. 11.

N. Y., New York—Eight Hundred Fifty Corp., c/o Jack Dempsey, lessee, J. P. and L. A. Kissling, 690 8th Ave., plans constructing store, cafe and offices, 814 8th Ave. $260,000. Demolition awarded to E. R. Walsh, 205 East 42nd St.

N. Y., New York—Two Thousand Two Hundred Thirty Grand Concourse, Inc., c/o Cross & Brown, 270 Madison Ave., plans by J. M. Feldon, 250 West 57th St., 6 story, brick, concrete apartments, 182nd St. and Grand Concourse. To exceed $105,000.

N. Y., New York—City plans by Ferdinand Sos and J. Tarney, 111 East Mosholu Parkway residential development, Reservoir Oval and Mosholu Parkway. $5,800,000. **Maturity indefinite.** Project is proposed as low rental apartments, financed by P.W.A. or other loan. Corporation to be formed, c/o architect.

N. Y., New York—Four Hundred Five East 72nd Street Corp., S. Minskoff, pres., 521 5th Ave., plans by Boak & Paris, 101 Park Ave., 6 story, 100x100 ft., brick apartment, plain found., 411 East 72nd St. $125,000.

N. Y., New York—Manhattan General Hospital, 161 East 90th St., plans by E. J. Kahn, 2 Park Ave., 11 story, brick, steel hospital, concrete found., 149 East 90th St. To exceed $250,000.

O., Cleveland—Syndicate, c/o C. N. Lowe & N. Jeavons, archts., 12419 Cedar Rd., making plans 2 story, basement, 80x280 ft., brick, steel, rein.-con. hotel. $125,000.

Pa., Pittsburgh—Greater Pittsburgh Exposition Society, Oliver Bldg., plans exposition, involving removing all buildings and structures on site, bounded by Manchester Bridge, Barbeau St., Duquesne Way, to low water line and construct new building for housing permanent exposition convention hall, etc. $3,000,000. Lease from city to run 50 years. Janssen & Cocken, Century Bldg., archts.

Pa., Rosemont — Rosemont College sketches made by G. I. Lovatt, Architects Bldg., Phila., stone chapel. $150,000.

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†*Federal Government.*

Commercial Buildings (Continued)

Tex., Austin—F. S. Hofues, trustee, Dallas, and c/o H. F. Kuehne, archt., 808 Littlefield Bldg., sketches by R. Bryan, Dallas, 6 story, 50x109 ft., concrete, steel apartment hotel, concrete found., 19th and University Ave.

Wis., Rhinelander—St. Mary's Hospital plans by E. Brielmaier & Son, 735 West Water St., Milwaukee, altering and constructing 3 story, basement, brick, steel hospital addition.

BIDS ASKED

Wis., Marshfield—St. Joseph's Hospital bids about Dec. 1, 3 story, basement, 42x90 ft., brick, steel hospital. E. Brielmaier & Sons, 735 North Water St., Milwaukee, archts. Noted Oct. 27.

CONTRACTS AWARDED

Conn., New Haven—Marc Eidlitz & Sons, general contractors, 100 East 42nd St., New York, electrical work, for Timothy Dwight Group, at Yale University, Temple, Grove and Wall Sts., for Yale University, T. W. Farnham, constr. supt., to Lord Electric Co., 105 West 40th St., New York***arches, to Senn Herrick Corp., 300 Madison Ave., New York***heating and ventilating, to Baker Smith & Co., 576 Greenwich St., New York. Noted July 19, under "Contracts Awarded."

Mass., Boston—Shepard & Stearns, 65 Franklin St., Boston, 7 story, basement, 41x81 ft., brick, structural steel, concrete fur storage, incl. heating, plumbing, Washington St., to Hew Constr. Co., 694 Washington St., for I. J. Fox, Inc., 403 Washington St. Bids Sept. 12, awarded about Oct. 10. Noted Sept. 13.

Mo., Hermann—J. H. Helmers, c/o Johnson & Maack, archts., Chemical Bldg., St. Louis, 2 story, 35x105 ft., brick theatre, to C. Baumstark, Hermann. C. M. Bassman, Hermann, lessee. Bids Oct. 11.

N. Y., Albany—Our Lady Help of Christians Roman Catholic Church, general contract parochial school, to W. G. Sheehan Co., Inc., 28 DeWitt St., Albany***structural steel, to J. McKinny & Sons Co., 925 Bway.***electrical work, to Gander Electric Co., 435 Central Ave. Est. about $105,000.

Ont., Sault Ste. Marie—Provincial Govt. of Ontario, Toronto, for Shingwauk Home, concrete, steel, to J. J. Fitzpatrick, $151,784.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Clarksburg — SUGAR REFINERY — Amalgamated Sugar Co., H. A. Benning, vice-pres., Ogden, Utah, plans sugar refinery addition to main plant, spur tracks, cattle pens, warehouses and miscellaneous smaller structures on 75 acre site. $1,000,000 or more.

Calif., Fillmore—PACKING PLANT—Fillmore Citrus Assn., working drawings by R. C. Wilson, Say Rd., Santa Paula, 100x183 ft., rein.-con. packing plant, having rein.-con. basement. $60,000. Bids in about 3 weeks to selected list of contractors.

Ia., Dubuque—PLANT—Dubuque Packing Co., 17th and Sycamore Sts., plans plant addition to double present killing capacity space, 17th and Sycamore Sts. $100,000.

Md., Baltimore — PLANT — Metal Package Corp., 811 South Wolfe St., Baltimore, and 110 East 42nd St., New York, plans plant additions and expansions. To exceed $50,000.

Md., Baltimore—PLANT—Goodyear Tire & Rubber Co., 1144 East Market St., Akron, O., soon lets contract superstructure 2 story, basement plant, Mt. Royal Ave. and Oliver St. $150,000. Wilbur Watson & Associates, 4614 Prospect Ave., Cleveland, O., archts. Foundation for same awarded.

Mass., Boston—PACKING HOUSE—Ferry St. Realty Co., A. Rubinovitz, 12 Ferry St., soon takes bids remodeling exterior and interior of present 6 story, basement, irregular sized packing house and constructing addition to same, Ferry St., concrete found. To exceed $40,000. Private plans.

Mass., Dorchester—W. M. Bacon, archt., 530 Gallivan Bldg., soon take bids 2 story, basement, 88x158 ft., brick, stone market, concrete found., Gallivan Blvd., for Superior Realty Co., Inc., Mr. Paul Citrino, c/o Uphams Corner Market, 600 Columbia Rd. $60,000. Noted Sept. 13.

Mo., Kansas City — FEED MILL — Tarkio Molasses Feed Mill Co., A. H. Schmidt, pres., 5330 Locust St., plans rebuilding 2 story, basement, 120x300 ft., brick, timber, 1739 Grunolle St. $100,000.

Mo., St. Louis—PLANT—Carlova, Inc., 200 5th Ave., New York, plans plant on 50x50 ft. site adjoining present 3 story plant, Adelaide and McKissock Aves. **Maturity indefinite.**

N. Y., Long Island City—SMELTING and REDUCTION PLANT—Goldsmith Bros. Smelting & Refining Co., 74 West 46th St., New York, plans 53x200 ft. smelter and reduction plant, 12th St. To exceed $28,000 with equipment. Site acquired.

N. Y., Maspeth — PLANT — Metal Products Corp., 110 East 42nd St., New York, plans plant extensions, Grand and Garrison Aves. To exceed $50,000 with equipment.

N. Y., Middletown—BREWERY—Orange Co. Brewery, 133 Lake St., plans repairing brewery, damaged by fire. To exceed $50,000.

N. Y., New York—Corporation, c/o L. P. Ernst, 778 East 179th St., plans 6 story, brick apartment, 208th St. and Kossuth Ave. To exceed $110,000. Architect not appointed.

N. Y., New York—STORAGE—E. Higgins, 50 Union Sq., plans storage, 604 West 43rd St., $120,000.

N. Y., New York—STORAGE—New York State Realty Terminal Co., 466 Lexington Ave., plans 2 story, brick, concrete, 661 West 33rd St., $50,000.

N. C., Burlington—MILL—John J. Morton & Co., Burlington, soon lets general contract mill, $30,000 or more. R. C. Biberstein, Charlotte, engr.

O., Hamilton—PLANT—Metal Package Corp., 110 East 42nd St., New York, and Hamilton, plans plant extension and addition. To exceed $100,000.

O., Springfield — FACTORY — Champion Co., lets contract about Nov. 1, 2 story, brick, concrete, steel factory addition for manufacture of chemicals and funeral directors supplies. $50,000. G. L. Ohmart, Springfield, archt.

O., Youngstown—MILL—Youngstown Sheet & Tube Co., Stambaugh Bldg., plans cold rolling mill at Campbell Plant. $2,500,000.

Ore., Salem — BOTTLING PLANT — Salem Brewing Co. plans bottling plant. $50,000.

Pa., Washington—PLANT—Lackawanna Beer & Ale Corp., plans altering and constructing plant addition and equipment. To exceed $30,000.

S. C., Greenwood—PLANT—Nantex Mfg. Co., lessee, 350 Bway., New York, plans altering 2 story underwear manufacturing plant and equipment. Est. about $28,000 with equipment.

Tenn., Winchester — WAREHOUSE — Collins Fuel Co., plans 2 story, basement, brick, rein.-con., concrete, plain found., High and 5th Sts. $35,000. Architect not appointed.

Tex., Harlingen — PLANT — Snider Packing Co., c/o H. J. Humphreys, pres., plans 1-2 story vegetable, fish, etc. "Quick Freezing" packing plant. $40,000. Private plans.

W. Va., Wheeling — FACTORY — Hazel-Atlas Glass Co., Wheeling, soon lets contract altering and constructing 1 story, factory addition, Jacobs St. $125,000. Private plans.

Alta., Banff—MILL—Cascade Sawmill Co., Ltd. plans mill. $35,000.

Alta., Calgary—PLANT—Chambon Ltd. of London, England, H. E. Brightwell, mgr., plans plant for manufacturing machinery. $150,000.

B. C., Vancouver—PLANT—Sansan Flooring & Mfg. Co. Ltd. plans plant., $50,000.

B. C., Vancouver—PLANT—Signals & Signs Ltd. plans plant. $100,000.

B. C., Vancouver — PULP MILL — R. O. Sweazy, Montreal, Que., having private plans prepared for constructing sulphide pulp mill. $350,000. **Maturity 1935.**

Man., Winnipeg—PLANT—Western Vinegars Ltd., E. L. Isard, mgr., plans by T. Pringle & Son, Montreal, Que., brick plant. $60,000.

N. B., Moncton—FACTORY—Silver Tip-Fox Biscuit Co. plans factory to replace burned plant. $30,000 or more. Architect not appointed.

N. S., Annapolis Royal—PLANT—Canadian Ski and Woods Products Ltd. plans plant for manufacturing wood specialties, $45,000.

Ont., Drummondsville—PLANT—Eagle Pencil Co., 703 East 13th St., New York, plans 2 story, brick, steel, concrete plant addition. $40,000.

Ont., Emo—MILL and FACTORY—Langstaff & Shurg plans lath mill and box factory, $35,000.

Ont., Guelph—PLANT—White Sewing Machine Co. of Canada Ltd., G. Robert, mgr., plans plant. $50,000.

Ont., Newmarket—PLANT—Newmarket Dairy & Creamery Ltd., D. Williamson, mgr., plans plant. $40,000.

Ont., Petrolea—PLANT—Canadian Oil Co., C. A. Hale, supt., plans new topping and cracking units, vapor recovery plant tube still with steel tower 90 ft. high and 12 ground storage tanks 2,000 to 5,000 bbl. capacity each. $350,000 Interested in prices of everything.

Ont., Port Frank—PLANT—G. C. Walker, is incorporating Walker Salt Corp., to erect and equip plant for salt development. $250,000 capital. Interested in prices of all equipment.

Ont., Sarnia—PLANT—National Refining Co., Sarnia, plans reconditioning plant and cracking unit, $350,000.

Ont., Tillsonburg—PLANT—Tillsonburg Cabinet Wks., plans furniture plant addition, $35,000.

Ont., Toronto — PLANT — Stein-Hall & Co., 285 Madison Ave., New York, plans reconditioning factory for manufacture of starch products. Est. $30,000 or more with equipment. Architect not appointed.

Que., St. Felix de Valois—FACTORY—Beauclair Freres plans sash and door factory. $5,000. **Maturity this year.**

Sask., Regina—BREWERY—Regina Brewing Co. Ltd. plans addition to brewery. $50,000.

Philipine Islands, Manila—WAREHOUSE, c/o Dollar Steamship Co., 29 Bway., New York, San Francisco, Calif., and Manila, P. I., plans repairing and reconstructing warehouse, to exceed $50,000***Manila Terminal Co., Manila, plans repairing and reroofing warehouse, to exceed $30,000. Architects not appointed.

Virgin Islands, St. Croix—SUGAR MILL — Virgin Islands Co., St. Thomas, Virgin Islands, plans reconstructing Bethlehem sugar mill, $200,000.

BIDS ASKED

Calif., Santa Rosa — BREW HOUSE — See "Contracts Awarded."

Md., Baltimore—PLANT—Oct. 29, by Schluderberg Kurdle Co., 3800 East Baltimore St., 6 story, basement, 60x110 ft. beef killing plant, 3800 East Baltimore St. $200,000. H. P. Henschein, 59 East Vanburen St., Chicago, Ill., archt.

N. Y., Webster—POWER PLANT—See "Contracts Awarded."

R. I., Lincoln—SUPER SERVICE STATION—J. F. O'Malley, archt., 84 Broad St., Pawtucket, taking bids 1 story, basement, irregular sized brick, concrete, steel, Smithfield and Reservoir Aves., for G. M. Miller, 618 Smithfield Ave., Pawtucket.

CONTRACTS AWARDED

Calif., Santa Rosa—BREW HOUSE—Grace Bros., 3 story, 40x40 ft., rein.-con. brew house, installing 18 steel tanks on steel support. Day labor under supervision of L. H. Nishkian, 525 Market St., San Francisco, engr.

Ind., Terre Haute—FACTORY—Owens-Illinois Glass Co., 3rd and Voorhees Sts., general contract, 160x400 ft. brick, steel addition, to Glenn W. North Co., 9th and Tippecanoe Sts. Est. $29,000.

Ia., Burlington — BREWERY — Burlington Brewing Co., 900 Block, Osborne St., brewery and equipment, separate contracts awarded. Est. about $70,000. Refrigeration, to Frick Co., Waynesboro, Pa. G. E. Wells Co., 420 Security Bldg., St. Louis, Mo., engrs.

Ia., Dubuque — PLANT — Dubuque Packing Co., 17th and Sycamore Sts., plant, to W. L. Yokom, Dubuque. Est. $100,000. Noted Oct. 18.

Ia., Grinnell—PLANT—Swift & Co., 75x100 ft., plant addition, West St., to J. H. Huntzinger & Co., Davenport.

Md., Baltimore — WAREHOUSE — Baltimore Pure Rye Distillery Co., Dundalk St., for Warehouse 2, 4 story, to Cogswell Constr. Co., 406 Park Ave., Baltimore, $75,000. B. Frank, 517 North Charles St., archt.

Mich., Detroit—FACTORY—Bower Roller Bearing Co., 3040 Hart Ave., 2 story, 60x200 ft., brick, steel factory, plain found., Hart Ave., to Bryant & Detwiler Co., 2304 Penobscot Bldg., Albert Kahn, Inc., New Center Bldg., archts.

N. Y., Albany—BULK STORAGE—Colonial Beacon Oil Co., Inc., 155 East 44th St., New York, 6 storage tanks, 74x86 ft. office, warehouse, with 32x60 ft. wing, to Chicago Bridge & Iron Wks., 165 Bway., New York. Est. $100,000. Private plans. Awarded about Oct. 10.

N. Y., New York — DISTRIBUTION — Anheuser-Busch, 515 West 16th St., 2 story, 125x155 ft. distribution building, 33rd St. and 12th Ave., to Equity Constr. Co., 25 West 43rd St. Est. $50,000 exclusive of equipment.

N. Y., Niagara Falls—PLANT—Acheson Graphite Co., Niagara Falls, plant addition, to W. S. Johnson Building Co., Niagara Falls. Contractor awarded contract for structural steel, to McClintic Marshall, Pittsburgh, Pa. Est. exceeds $100,000.

N. Y., Webster—POWER PLANT—Rochester Gas & Electric Co., Rochester, electric plant and distribution system, day labor and separate contracts. Private plans. Public Service Comm. granted permit.

O., Cleveland—STORAGE—Lincoln Electric Co., 12818 Coit St., storage, etc., to Austin Co., 16112 Euclid Ave. Separate contracts awarded. Est. $30,000 or more.

Pa., Phila.—FACTORY—Stokes & Smith Co., Summerdale Ave., machine manufacturing building, Summerdale Ave. and Roosevelt Blvd., to Robert E. Lamb Co., 841 North 19th St. Est. $35,000. Morris & Erskine, 1716 Cherry St., archts.

Pa., Pittsburgh—MANUFACTURING PLANT—Mine Safety Appliance Co., North Braddock Ave., general contract brick, steel, to J. M. Baldwin, 1000 Macon Ave. N.S.***plumbing, to Weldon & Kelly, 1801 Locust Way***electrical work, to W. C. Hemmerle Electric Co., 212 Olympia St. B. H. Prack, Martin Bldg., N.S., archt.

R. I., Providence—STORAGE—H. Priest, 1004 Hope St., 2 story, basement, 40x120 ft., concrete block, concrete found., Hope St. Owner builds. To exceed $28,500. Private plans.

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For official proposal advertising see Searchlight Section

†*Federal Government.*